

An exploration of perceived control, acceptance, emotional distress, knowledge and self care in the control of Type II diabetes, in an older adult population.

By Victoria J Thurlby

**Thesis submitted to the University of Edinburgh
For the degree of Doctorate in Clinical Psychology**

August 2008

Declaration

I declare that this thesis has been composed by me and that the work herein is my own. This work has not been submitted for any other degree or professional qualification.

Signed:

Acknowledgements

I would like to thank the diabetes department staff for allowing me to conduct this piece of research and for their help. I would also like to thank the outpatient department receptionist's for all there help during the data collection phase. Thank you also to everyone who participated in the study by completing questionnaires.

I am very grateful to my academic supervisor, Dr David Gillanders and my clinical supervisor, Dr Charlotte Homes for all there guidance on this project; from the planning to completion.

Finally, I would like to thank my family, friends and Tom for all their support and encouragement throughout this doctorate.

CONTENTS

	Page Number
ABSTRACT	6
1. INTRODUCTION	7
1.1 Aim of the study	7
1.2 Importance of the study	7
1.3 Plan for the introduction	8
1.4 Introduction to diabetes	9
1.4.1 Definition	9
1.4.2 Prevalence	10
1.4.3 Costs – Financial and Personal	10
1.4.4 Type-II diabetes	12
1.5 Older adults issues	13
1.6 Traditional theories of health related behaviour changes	14
1.6.1 Health beliefs	15
1.6.2 Attribution theory	16
1.6.3 Health locus of control	16
1.6.4 Stages of change model	20
1.7 Cognitive models	22
1.7.1 Health belief model	22
1.7.2 Protection motivation theory	26
1.8 Social cognitive models	27
1.8.1 Theory of planned behaviour	27
1.8.2 Health action process approach	29
1.8.3 Self-regulatory model	29
1.9 Models so far	32
1.10 New models	34
1.9.1 Perceived control	34
1.10.2 Perceived control in chronic illness	36
1.10.3 Perceived control and diabetes	38
1.10.4 Knowledge of diabetes	40
1.10.5 Knowledge in diabetes management	41
1.10.6 Acceptance	43
1.10.7 Acceptance in chronic illness	46
1.10.8 Acceptance in diabetes	48
1.10.9 Depression and chronic illness	50
1.10.10 Depression and diabetes	54
1.9 Goals and unique contributions of the present study	56
1.10 Implications	58
1.11 Aims of the study	58

1.12	Hypotheses	59
2.	METHOD	60
2.1	Design	60
2.2	Statistical power	60
2.3	Ethical consideration	61
2.4	Participants	61
2.5	Recruitment/ confidentiality	62
2.6	Inclusion criteria	63
2.7	Measures	64
2.7.1	The Perceived Control of Diabetes Scale (PCDS)	64
2.7.2	The Diabetes Knowledge Scale (DKS)	65
2.7.3	The Acceptance and Action Diabetes Questionnaire (AADQ)	67
2.7.4	The Self-Care Inventory-Revised Version (SCI-R)	68
2.7.5	Hospital Anxiety and Depression Scale (HADS)	69
2.7.6	HbA1C (glycated haemoglobin)	70
2.8	Data management	72
2.8.1	Screening data/ missing data	72
2.9	Statistical analysis	73
2.10	Preliminary analysis	73
3.	RESULTS	74
3.1	Total sample	74
3.2	Age, time since diagnosis & HbA1c levels	74
3.3	Descriptive data	75
3.4	Assessing the regression model: outliers	76
3.5	Assessing the regression model: checking assumptions	77
3.6	Missing data and the analytic plan	77
3.7	Hypothesis testing	79
3.7.1	Hypothesis 1	79
3.7.2	Hypothesis 2	79
3.8	Secondary analysis	80
3.8.1	Age Groups	80
3.8.2	Adequate vs. Inadequate blood glucose control (HbA1C Levels)	81
3.8.3	Gender	81
3.8.4	Missing data	82
3.9	Reliability of modified Perceived Control of Diabetes Scale	82
3.10	Conclusions	83
4.	DISCUSSION	84
4.1	Personal control	85
4.2	Knowledge	86
4.3	Acceptance	87
4.4	Emotional distress	89
4.5	Medical control	89
4.6	Situational control	91
4.7	Self-care	92
4.8	Exploratory findings	93
4.9	Limitations and directions for future research	93

4.9.1	Cross-sectional study design	93
4.9.2	Missing data and sample size	94
4.9.3	Measures used	97
4.9.4	Uncontrolled variables	97
4.10	Strengths of the study	98
4.11	Theoretical implications	99
4.12	Clinical implications	100
4.13	Conclusions	101
REFERENCES		102
APPENDICES		

APPENDICES

Appendix A: Patient information sheet
Consent form

Appendix B: The Self-Care Inventory – revised version
The Acceptance and Action Diabetes Questionnaire
The Diabetes Knowledge Scale
Hospital Anxiety and Depression Scale
The Perceived Control of Diabetes Scale

Appendix C: Exploratory data tables:
i) Pearson's correlation coefficients for 64-75 year old age group & HbA1c
ii) Pearson's correlation coefficients for 75-84 year old age group & HbA1c
iii) Independent t-test table for age group comparison
iv) Pearson's correlation coefficients for adequate blood glucose group & HbA1c
v) Pearson's correlation coefficients for inadequate blood glucose control group & HbA1c
vi) Independent t-test table for adequate vs. inadequate control group comparison

Appendix D: Independent t-test table for missing data comparison

Appendix E: Means and standard deviations for missing data groups

TABLES

- Table 3.0: Means, standard deviations for age, duration since diagnosis and HbA1c Levels
- Table 3.1: Means and standard deviations for Acceptance (AADQ), Knowledge (DKN), Personal control (PC), Medical control (MC), Situational Control (SC), Self-care (SCI-R), Emotional Distress (HADS) and HbA1C
- Table 3.2: Correlations

ABSTRACT

Introduction:

Several factors have been identified in the literature as being influential in improving self-care and blood glucose control in diabetic populations. Many of these factors have been looked at individually making it difficult to directly compare the effects of one to another. This study directly compares several factors (self-care, knowledge of diabetes, acceptance, perceived control and emotional distress) in relation to their role in diabetes management in an older adult population with Type-II diabetes.

Method:

A quantitative cross-sectional design was employed to examine the role of the aforementioned factors in relation to diabetes management (defined as blood glucose level or HbA1c level). Patients with Type-II diabetes aged 65 or over were identified and sent information regarding the study. They were then approached at their routine clinic appointment and asked to participate. A total of 81 participants took part in the study completing a series of questionnaires. Information on age, duration of diabetes and blood glucose level (HbA1c level) was gathered for each participant.

Results & Discussion:

Correlations were performed to examine the relationships between (self-care, knowledge, acceptance, perceived control (three sub-scales), emotional distress) and blood glucose levels (HbA1c levels). Significant correlations were found for perceived medical control and HbA1c levels and for acceptance and HbA1c levels. There were no significant differences in age groups (young-old, old-old) or differences in groups with adequate versus inadequate blood glucose control. Methodological issues, clinical implications and directions for future research are discussed.

1. Introduction

1.1 Overall aim of the study

This study aims to examine the relationships of the following factors - perceived control, acceptance of illness, knowledge of diabetes, emotional distress and self-care in relation to glycaemic control (measured by HbA1c level) in an older adult population with Type-II diabetes.

1.2 Importance of this study

Prior to the 1970's the main source of mortality for adults was from infectious diseases such as tuberculosis. Since the eradication of these infectious diseases, the focus has shifted to non-infectious disease such as cancer, heart disease and diabetes. However, increased funding in health care has not led to a decline in mortality from these types of disease. The lack of effectiveness of curative measures has led to a change in the health policy agenda towards prevention and long-term management (Allison, 1991) which has influenced recent documents such as 'Better health, better care' (Scottish Government, 2007) and 'Designed to Care' (The Scottish Office, 1997). This study will examine the role of psychological factors in relation to diabetes management. It is hoped that these factors can then be used to inform illness management and prevention programmes in the future.

1.3 Plan for the introduction

The introduction is structured in the following way. Firstly diabetes will be defined and some of the tasks involved in diabetes management outlined. This will be followed with a discussion of some of the current issues in diabetes management, including prevalence rates, costs and the impact of an aging population.

Next traditional theories of health-related behaviour change will be outlined and latterly compared. Following on from this, new directions in health behaviour research will be examined, incorporating the concepts of perceived control, knowledge of diabetes, acceptance and finally the role of emotional distress. Each of these factors will be discussed in relation to their theoretical basis, followed by a brief review of the evidence for each, in relation to chronic illness generally and then to diabetes specifically.

Finally the goals of the present study will be presented alongside the potential implications of this research and the current hypotheses.

1.4 Introduction to Diabetes

1.4.1 Definition

The World Health Organisation (WHO) (2006) defines diabetes mellitus (herein diabetes) as a chronic disease where the pancreas either produces insulin that it cannot use effectively or produces insufficient insulin. Insulin is used in the body to regulate blood sugar. A common outcome of poorly controlled diabetes is hyperglycaemia (raised blood sugar), which leads to risk of micro and macro vascular damage.

The WHO recognises a range of different types of diabetes. Type I diabetes is defined by a lack of insulin production. This typically has an onset in adolescence and leaves the person insulin dependent, requiring daily injections of insulin. Type-II diabetes is where the body cannot effectively use insulin produced by the body. This is the most common type of diabetes worldwide. This typically has a later onset compared to Type I diabetes; however as the greatest risk factor of Type-II diabetes is excess weight and inactivity it is also seen in obese children. A third type of diabetes is gestational diabetes. This is 'hyperglycaemia' first identified during pregnancy.

1.4.2 Prevalence

Approximately 171 million people worldwide had a diagnosis of diabetes in the year 2000. This figure is estimated to increase to 366 million by the year 2030 (Wild *et al.*, 2004). The largest predicted increase in diabetes over the next 25 years will be in those over 65 years old. Bjork (2001) argues that the combination of a generally increasing world population together with an ageing population and a move to a more westernised lifestyles are responsible for the expected increase in Type-II diabetes.

1.4.3 Cost – Financial and Personal

The WHO (2006) reports that between 2.5 and 15% of health care budgets worldwide are applied to diabetes. The current and projected financial cost of this disease in America is estimated at \$132 billion in 2002 and \$192 billion by 2020 (American Diabetes Association, 2003). This financial cost is mainly due to increased hospitalisation rates of diabetic populations (three times more than non-diabetic populations, Bjork, 2001). The risk of premature death is higher in diabetic populations than none and the risk for those over 65 years old is three times higher than non-diabetic populations (Bjork 2001). Practical costs include: frequent visits to doctors/consultants, home nurse visits, medication and transport costs (Bjork, 2001). Gilmer *et al.* (1997) found that the medical costs associated with diabetes increased linearly with the HbA1c level for an individual. HbA1c is a highly sensitive measure reflecting a person's average blood glucose level over the past two-three months (see

method section for full description). Gilmer *et al.* (1997) found that once a person's HbA1c level goes above 7%, a 1% increase in HbA1c increases the medical costs for that person by 10%. In line with this, the UK Prospective Diabetes Study (1998) indicates that a reduction in HbA1c level relates to a reduction in health complications.

The personal cost of diabetes includes the impact of the symptoms alone and the impact those symptoms have on individual quality of life. The symptoms of Type I diabetes include weight loss, changes in vision, tiredness, excessive thirst and polyuria. Type-II diabetes has a similar pattern of symptoms, however these are often less severe at the early stages which means it often goes undetected for several years and only gets identified once complications have developed (WHO, 2006). Over time, diabetes can lead to 'blindness, limb amputation, kidney failure and early death' (Hixenbaugh & Waugh, 1991, p.226).

Diabetes has a wide impact upon psychological health, which then impacts upon individual's ability to manage the condition (White, 2001). According to White (2001) diabetes has the potential to impact upon all aspects of life including: pain, sleep, energy, mobility, activities of daily living, dependence on medication, social relationships, social support, sexual activity, financial resources, physical safety, health and social care, home environment, participation and opportunities for recreation, leisure and transport.

1.4.4 Diabetes Management

Diabetes management is about glucose control which in turn relates to behavioural control i.e. lifestyle. The time involved in managing diabetes and the restrictions it places on lifestyle may also be perceived as a potential cost. Shillitoe (1989) identified some of the tasks involved: 1) Balancing events that increase blood glucose (eating carbohydrates) with events that reduce blood glucose (activity/injections of insulin) in order to keep blood glucose within the normal range. 2) Eating specific amounts at specific times. 3) Taking medication in the correct dose at the correct time. 4) Monitoring blood glucose at specific times to monitor self-management and direct future effort. 5) Taking exercises and other preventative measures. Some people, especially those with Type I diabetes, need to mimic this with frequent injections up to four times per day.

1.4.6 Type-II diabetes

Of all people with diabetes, Type-II diabetes accounts for approximately 75%. The high prevalence is linked to western lifestyles that are more often associated with a sedentary existence and eating energy dense foods. There is also a higher incidence of Type-II diabetes in low socio-economic groups, leading DiMatto & DiNicola (1982) to suggest this is in-part due to low socio-economic groups being less likely to engage in self-care behaviours or to have 'future-oriented' views of their health.

1.5 Older adults issues

Marin *et al.* (1995) identified several groups that are underserved in health related research; these include minority ethnic groups, women, low-income groups, children and older adults. These researchers argue that health education programs designed for one population cannot be assumed to be applicable to all. In a review of one health education journal between 1985 and 1994, Connell (1999) reported that only 15% of articles included older adults in their sample. In addition Connell (1999) found that when older adults were included in research they were frequently categorised as one homogenous group. Connell (1999) argues that in using a lifespan perspective we should be looking at groups of older adults, as there are distinct developmental differences between the young-old adult (over 65 years) and the oldest-old (over 85 years old).

They go on to suggest that researchers and those responsible for developing health-education interventions with these groups need to identify the norms, beliefs and attitudes held by such groups in order to create effective interventions with tailored messages and strategies. In addition, researchers should focus on identifying the most effective and acceptable channels of information giving for these groups i.e. looking at who are older adults most receptive to taking health advice/messages from.

There is an emphasis in the literature on Type-I diabetes rather than Type-II, whereas Type-II diabetes actually has more cost/disability associated with it. As a result there

is a lack of knowledge regarding the role psychological factors play in Type-II diabetes management, especially in older adult populations (Hampson *et al.*, 1995).

In summary, diabetes is one of the fastest growing health problems in westernized countries. Within this, older adults make up a substantial proportion of people with Type-II diabetes. Research into diabetes has primarily focused on Type-I diabetes and/or younger populations, as a result research into diabetes management in older adults is lacking. This study aims to fill some of this gap in the literature by focusing solely on older adults with Type-II diabetes.

1.6 Traditional Theories & models of health-related behaviour change

In the 19th century, traditional biomedical models of health suggested that illness was caused by biological changes beyond the control of the individual. Therefore the medical professional was viewed as being responsible for treating the disease. From this perspective the mind and the body were viewed as being independent from each other.

In the 20th century, this biomedical model was challenged. Early writers (Freud, 1893, & Charcot, 1889) described ‘hysterical paralysis’ wherein patients who presented as being paralysed had no obvious physical cause, indicating an interaction in body and mind. This was the beginning of a new perspective about health based on the premise that psychological factors could be both the ‘consequence and cause’ of physical illness.

The development of the field of health psychology led to further debate regarding the mind and body interaction and its importance in the cause and treatment of illness. One of the central theories proposed was that illness is caused by a combination of factors, biological, psychological and social. This led to the biopsychosocial model of health and illness (Engel, 1977). Due to this integration of factors the individual was now viewed as an active agent in their health and illness, who has at least partial responsibility for change.

Following this, the field of health psychology began to investigate the role of beliefs in predicting health behaviour and evaluating the role of psychology in the treatment of illness. Several psychological factors have been studied, including cognition, behaviour, emotion and social factors.

1.6.1 Health beliefs

As early as 1979 McKeown argued that our health primarily depends on modifications of health behaviours. Health behaviours are described as any behaviour, which relates to a person's health status, positively or negatively. The majority of research aiming to predict health behaviours has emphasised the importance of beliefs. Primarily this research has focused on stages of change models, locus of control and attribution theory (Ogden, 2000).

1.6.2 Attribution theory

Heider (1944) argued that people seek to understand causality. Kelley (1967, 1971) suggested people make attributions about causality based on a number of dimensions. These dimensions include having orientations that are controllable or uncontrollable, stable or unstable, internal or external, global or specific.

Research suggests that attributions about illness translate to health behaviours. For example, Bradley *et al.* (1987) found that the treatment choice of people with diabetes related to perceived control over their illness.

1.6.3 Health locus of control

Health Locus of Control (HLC) can be viewed as an application of the internal/external dimension of attribution theory to health. This stems from Social Learning Theory (Bandura, 1986) and relates to perceived control over future events, as opposed to causal beliefs, which are beliefs regarding the causes of past events. The key component of this theory is that individuals believe their health is either internally controlled by them i.e. as a result of their actions, or it is externally controlled by other forces unrelated to their actions, such as medical interventions (Conner & Norman, 1996).

Despite the logic of this model there have been several criticisms of it, including the suggestion that LoC should not be viewed as a uni-dimensional construct. In response to this argument, Wallston *et al.* (1978) developed the multidimensional health locus of control scale (MHLC).

This scale measures generalised expectancy beliefs with respect to health along three dimensions.

- 1) The extent to which individuals believe their health is the result of their own actions (internal HLC)
- 2) The extent to which individuals feel their health is under the control of powerful others (Powerful others HLC)
- 3) The extent to which individuals believe their health is owing to chance or fate (Chance HLC)

The traditional belief regarding health locus of control is that internality is assumed to be good and that these individuals are more likely to engage in health-promoting activities.

In line with this, studies such as one by Norman *et al.* (1997) demonstrate positive correlations between internal locus of control and health behaviours such as exercising. Importantly, however many of these correlations have not been high (less than $r = .2$) and in the case of the Norman *et al.* (1997) study, internal LoC explained less than 1% of the variance in exercise behaviour. Steptoe and Wardle (2001) also found a small but significant correlation between internal LoC and exercise

($r=0.094$). Despite this small correlation coefficient when the authors performed multiple logistic regression on the data and separated the data into quartiles they found that the group with the highest reported internality ratings (highest quartile) were 77% more likely to engage in exercise compared to those with the lowest internality ratings.

In contrast to the suggestion that internal LoC is generally positively related to good health, Wallston *et al.* (1978) suggested that having a strong powerful others HLC can be more effective in cases of chronic or acute illness. For example, an individual may find it detrimental to hold strong beliefs that they must take responsibility for their health in circumstances which are actually uncontrollable, for example in many forms of cancer (Allison, 1991 & Rotter, 1975). In contrast, under conditions that can be modified through behaviour change (such as diabetes) attempts to alter health locus of control may be more advantageous (Allison, 1991).

Studies examining the relationship between HLC beliefs and a number of behaviours, including exercise, weight-loss and alcohol have mostly been inconclusive. Slenker *et al.* (1985) found joggers to have a more internal HLC than non-joggers. Despite this evidence, other studies have found either very weak relationships or no relationships at all between exercise and internal locus of control (Calnan, 1989 & Norman, 1990).

Like the studies of exercise, studies examining the relationship between internality and weight loss have also been inconclusive. A study by Gierszewski (1983) found

no evidence to support the belief that people with internal LoC lose more weight than those externally oriented. Conversely Chavez and Michaels (1980) found that people with internal LoC lost more weight than individuals with external LoC.

It could be argued that weight loss is determined not only by an internal locus of control (belief that they can control food intake) but also by powerful others locus of control (adhering to advice given by professional dieticians). Indeed Wallston *et al.* (1978) argued that strong powerful others HLC belief may be predictive of health behaviour when recommended by a health professional. Despite this, no significant relationships were found between any of the health locus of control dimensions and weight loss in a six-week study by Schiffener and Ajzen (1985). Saltzer (1982) also found no relationship between locus of control and completion of a weight loss program.

In summary, the research on HLC and the utility of the MHLC scales is mixed. This has led some to question the specificity of the scales used to measure the concept. Noting that these measures often looked at generalised behaviours and beliefs related to health across many situations (smoking, exercise, diabetes etc) instead of condition specific measures of control. This advancement was deemed necessary as individuals may hold different beliefs about control in relation to different health behaviours (Kirscht, 1972).

1.6.4 Stages of change model (Transtheoretical Model)

Incorporating the notion that an individual's social and cognitive beliefs impact upon health behaviours Prochaska and DiClemente (1983) attempted to explain behaviour change by developing a model conceptualised as a five-stage process relating to the individuals' readiness to change. The proposed stages include: precontemplation, contemplation, preparation, action and maintenance. Individuals' progress may vary as they do not always move through the stages in this order and could possibly get 'stuck' at certain stages. Progress through the stages is expected to depend on the individual using the correct processes at the correct stage. This model also suggests individuals will take account of costs and benefits of changes at various stages. This model has been widely used in health settings to tailor interventions to the stage of change the individual is perceived to be in at that time.

Despite its widespread use in health settings there are several criticisms of this model, including the idea that people might actually be on a continuum of change rather than passing through distinct stages (Weinstein *et al.*, 1998). Rakowski *et al.* (1992) for example, measured the perceived advantages and disadvantages of mammography; the results indicate that advantages and disadvantages differ depending on where people were in the stages of change model. However, these changes in advantages and disadvantages changed linearly, possibly reflecting an underlying continuum. Armitage *et al.* (2004) and Weinstein *et al.* (1998) note that the beliefs and strategies that cause individuals to move between stages are still poorly understood.

In a systematic review of the Stages of Change literature Whitelaw *et al.* (2000) argued that any theoretically sound assessment of a predictive model should be associated with its ability to predict future outcomes/behaviours without the individual having any awareness of the model and its expectations based upon it. However, they found that in many studies participants have already identified themselves as being at particular stages in the model and therefore any progression through the stages may be due to their expectations and motivations gained from having an awareness of the model rather than due to a 'natural' progression. They also argue there is a general lack of well-conducted research investigating the models' predictive power.

Recently the 'pathways to change' intervention has been developed as a way of utilising the stages of change model to influence health behaviour change. This intervention has been applied to people with diabetes in order to improve glycaemic control (Jones *et al.*, 2003). This is a self-care intervention providing telephone and postal information such as self-help advice, newsletters and reports providing stage-based feedback for the patient together with telephone based counselling. These interventions were tailored for three independent groups targeting either improvement in healthy eating, reduction in smoking or improved self-monitoring of blood glucose. The researcher used questions regarding intentions to change and observations of behaviour in order to identify the stage each participant was at according the stages of change model.

The results indicate more participants moved to an action stage whilst receiving the pathways to change intervention compared to those receiving 'Treatment As Usual' (TAU). A significant reduction in HbA1c level was seen in those who moved to the action phase. Importantly, however, this study still does not explain which factors are important in moving between stages and as it only compares TAU with the intervention programme and therefore it is difficult to attribute the changes in patients self-care purely to this stages of change based intervention rather than to just the impact of receiving a behavioural intervention per se.

In conclusion '... attribution theory and the health locus of control emphasize attributions for causality and control...and risk and the stages of change model emphasizes the dynamic nature of beliefs, time and costs and benefits' Ogden (2000, p.23). Despite mixed evidence regarding the predictive ability of these factors they have all contributed to the development of later models of health beliefs and behaviours.

1.7 Cognitive models

Pure cognitive models suggest that behaviour is the result of rational information processing based on individuals' cognitions.

1.7.1 The health belief model

Incorporating elements of Locus of control Theory the health belief model (HBM), originally described by Rosenstock (1974), suggests that health related behaviours are the result of a set of beliefs held by the individual. These beliefs relate to the following set of dimensions: susceptibility and severity of illness, costs incurred and benefits accrued from carrying out health-related behaviour and the presence or absence of cues to action (these may be internal – i.e. noticing symptoms of illness, or external i.e. health education and information). Later revisions of the model led to the incorporation of ‘health motivation’ and ‘perceived control’ (Rosenstock *et al.*, 1988).

To date this model has been extensively researched, however consistent supportive evidence is lacking. A meta analysis looking at four of the original factors in the health belief model (Susceptibility, Severity, Benefits and Costs) was performed by Harrison *et al.* (1992). Using strict inclusion criteria they analysed data from 16 studies measuring all four factors in relation with their ability to predict a range of health behaviours including risk reducing behaviours and adherence to medical regimes. The results demonstrated significant relationships in 22 out of 24 cases. Despite this encouraging outcome, the effect sizes only ranged from 0.01 to 0.30 thereby accounting for less than 10% of the variance. In addition they also found that 15 of these lacked homogeneity, suggesting that despite claiming they measured the same HBM factor(s) they may have been measuring different underlying constructs.

The model has been criticised for basing itself on the premise that we make all health related decisions based on rational information processing which may not be accurate all of the time. This lack of consideration for emotional factors within the model is seen by some as an oversight (Ogden, 2000). As the model only accounts for a small percentage of the variance, most of the studies examining its predictive ability also suggest that factors out with the model are actually more responsible for behaviour change. In addition the model makes no allowance for the interaction of factors or the possibility that these factors may change over time (Schwarzer, 1992).

Despite these criticisms, elements of the HBM are still believed to have some value. In the diabetes literature there is some evidence supporting the HBM however there are also a number of studies which draw very different conclusions as to which factor best predicts adherence to self-care regimes. A study of adults with diabetes by Bloom and Hart (1980) reported a large correlation ($r = .5$) between the sum total of the HBM factors and overall compliance with regime scores. Individually they found that 'cues to action' had the strongest correlation to any single behaviour (insulin administration). Importantly, though, one must be cautious about the results as rather than using a validated and standardised measure of compliance the researchers used observation and their own compliance tool (self-report) based on factors they deemed important for good control of diabetes.

On the contrary, a study by Brownlee-Duffeck *et al.* (1987) reported a statistically significant portion of the variance in compliance was accounted for by the 'perceived benefits' factor in a sample of 13-64 year olds. On closer examination of the data it is

clear that just 4% of variance was accounted for in relation to glycaemic control compared to 26% in relation to self reported adherence to regime. Importantly self-care (self-reported) did not correlate to glycaemic control (good diabetes control) and should therefore be cautioned against as a sole measure of control. A different factor was also identified in a study by Polly (1992) who instead found (weak) relationships between 'perceived barriers to treatment' and reported adherence (-0.24 effect size) and 'perceived severity of disease' and glycaemic control (0.21 effect size).

Modified versions of the HBM have been suggested. The Extended Health Belief Model proposed by Aalto and Uutela (1997) added locus of control, self-efficacy, health value and social support to the original model. Their revised model explained 21% of the variance in self-monitoring of blood glucose and 14% of the variance in dietary adherence (in an adult sample), although there is no direct discussion of the variance explained by the model in relation to HbA1c levels (despite this being one of variables measured). Instead the authors acknowledge a moderate association between dietary adherence and HbA1c and between self-monitoring of blood glucose and HbA1c levels. A second study examining the extended HBM in relation to adolescent populations with diabetes, found the model only explained 18.5% of the variance in adherence to self-care tasks, 12.4% of the variance in adherence to diet and 13.1% of the variance in self-monitoring of blood glucose (Gillibrand & Stevenson, 2006). Again there is no discussion of how well the model predicts HbA1c levels.

In summary, there is evidence to suggest elements of the HBM are associated with health behaviour regulation. There do appear to be some significant relationships between various components of the HBM and adherence/compliance, indicating that these play a role in health behaviour on closer inspection however these relationships are often conflicting and/or weak.

1.7.2 Protection Motivation Theory

This theory was developed by Rogers (1975, 1983) as an extension of the HBM in order to predict intentions of behaviour change. It has similar components to the HBM, including ‘perceived severity’ and ‘susceptibility’. It also has response effectiveness, self-efficacy and fear. Response effectiveness means to hold the belief that changing your behaviour will lead to improvements in your health. ‘Self-efficacy’ is defined as having confidence in making changes and ‘fear’ means to make a threat appraisal on the basis of information and education about your illness. This model suggests that fear based on prior experiences and/or learning affects all five components of the model and leads to either an adaptive or maladaptive response. This model suffers the same criticisms as the HBM in that in order for it to successfully predict health behaviours and behaviour change it assumes that people are always rational at processing information.

1.8 Social cognitive models

These models look at predicting behaviour and/or intentions as well as attempting to explain why people fail to maintain behaviours. Developed by Bandura (1986), these models stem from social learning theory suggesting that people learn behaviours through observation and the application of reinforcement or punishment. Hence behaviour is based on expectancies about environmental cues, consequences of action, the competency to carry out the behaviour and incentives (reinforcement). Of note social cognitive theory has several similarities with the HBM in that perceived susceptibility/severity could be classed as an expectancy regarding environmental cues, perceived benefits are expectations regarding outcomes and the value of reducing perceived health-related threats may act as a strong incentive to action.

1.8.1 The Theory of Planned Behaviour (TPB)–Ajzen (1988)

Stemming from the theory of reasoned action, this model views the individual as being within a social context and therefore incorporates social cognitions' in the form of 'subjective norms'. Central to this model is the notion that behaviour is an outcome of intentions, which are themselves the product of several beliefs. These beliefs underlie the individual's 'attitude towards a behaviour', subjective norms (i.e. 'perception of social norms'), social pressure to act, and perceived control. Ajzen (1991) suggests that perceived behavioural control could act either directly on behaviours (bypassing intentions) or act on 'intentions' that in conjunction with the effects of the other two components then lead to the behaviour. Research suggests

that adding perceived control to the model adds to its predictive ability (Godin & Kok, 1996, Schifter & Ajzen, 1985).

The TPB as a whole has been used to explain and predict various health behaviours, including exercise, dietary choice and smoking (Conner & Armitage, 1998, Godin & Kok, 1996). Most of these studies aim to uncover the beliefs that underlie intentions to act so that these beliefs can then be established in the non-intentional groups using persuasive messages. A systematic review of studies using the TPB found that the TPB model explained 41% of the variance in 'intention to act' and 34% in actual 'health-related behaviour' (Godin & Kok, 1996).

Similarly, a meta analysis of 135 studies by Armitage and Conner (2001) found that the TPB explained 39% of the variance in 'intention' (0.63 effect size) and 27% of the variance in 'behaviour' (0.52 effect size). In addition, they found that the 'perceived behavioural control' construct accounted for large amounts of the variance in both 'behaviour' (0.37 effect size) and 'intention' (0.43 effect size) and the 'subjective norm' construct of the TPB was the weakest predictor of intentions. They found that 'intentions to change' and 'self-predictions' regarding change were better predictors of change than the individuals 'desire to change'. Unfortunately they also found that the TPB constructs were better predictors of a 'desire to change' than actual 'intentions' or 'self-predictions of change'.

Hardeman *et al.* (2002) carried out a systematic review of studies claiming to use TPB (30 studies) to establish its utility in developing and evaluating health behaviour

change interventions. Of the studies examined, the TPB was used for the measurement of all the interventions cited and was used to inform interventions in half of the studies; however only 14 were randomised controlled trials. Roughly half the studies that reported an effect based on the TPB intervention found a change in 'intentions to act'. Of these, half found positive changes; although these had weak effect sizes. They conclude that at present there is insufficient evidence to suggest that components of the TPB mediate the relationship between intention and behaviour. Of all the components studied, 'perceived control' appears to be one of the more robust and face valid elements of this model, which is why this variable will be examined in the present study.

1.8.2 The Health Action Process Approach – Schwarzner (1992)

This approach includes aspects of other models but distinguishes between an initial 'motivational' stage and a later 'action' stage. Again in this model, self-efficacy has a central role in both stages of the model, in developing motivation for change and latterly in maintaining plans of action and action control.

1.8.3 Self-Regulatory Model

Leventhal (Leventhal, 1970, Leventhal, Meyer & Nerenz, 1980) developed the self-regulatory model based on problem solving approaches to examine the relationship between illness representations (illness cognitions) and behaviours. This model proposes that faced with a problem (illness/symptoms) an individual is motivated to

return to normality as soon as possible i.e. to solve the problem/self-regulate. To do this they must firstly interpret the problem and give it a meaning, this model proposes that people do this by forming illness cognitions which incorporate themes of cause, consequence, identity, cure/control and the possible time line of the illness. Another element affecting the interpretation phase is the role of emotions. Leventhal (1970) acknowledges that identifying an illness will result in a change in emotional state and in addition, change in emotional state can affect the meaning of the illness. As a result, both the emotional state of the person and the meaning of the illness affect the next stage in the model, the development and use of coping strategies. The final stage in the model is appraising the effectiveness of chosen coping strategies.

There are however criticisms of the model, most notably some have questioned whether it is appropriate to measure each element of the model separately if the model proposes that they all interact. Following on from this, it is difficult to see how one could measure the predictive value of one element of the model if they are all fully interactive (Ogden, 2000). In addition, Bosworth, Oddone and Weinberger (2005) argue that because the model is so complex it is hard to 'operationally define' elements of the model and as a result research has often just focused on the illness representations element.

A study by Moss-Morris (1996) found evidence to support the roles of both illness representations and coping strategies. They found that specific coping strategies and perceptions of controllability/curability, consequences of the illness and emotional

causes of the illness were strongly associated with levels of functioning, in patients with chronic fatigue syndrome.

In addition, research investigating the role of illness cognitions in recovery from illnesses has found evidence to suggest that perceived control over illness (in this case stroke) can predict recovery from disability (Partridge and Johnston, 1989). Further studies have replicated this pattern and also found that the relationship between perceived control and recovery was not mediated by emotions, coping or exercise, suggesting the perceived control element of illness representations is a key component of the model (Johnston *et al.*, 1999).

There is evidence to support the proposed interaction within the model. Specifically research by Heijmans (1998) found that people with chronic fatigue syndrome who perceived that they had minimal control over their illness, perceived the illness as incurable and perceived it as very serious, had more mental health problems than people with the opposite set of illness representations. This provides support for the theory that illness representations affect emotional state. However it is also possible that emotional state affects illness representations too.

Within this model we can see the influence of other models already discussed. For example attribution theory underpins the need to search for a meaning and assigning a cause to the illness. The need to control the illness relates to locus of control theory and an individuals perception that they or others can/cannot influence their illness or health.

1.9 Models so far

So far we have reviewed several models of health and illness. There are subtle differences between these models. For example, the transtheoretical model and the Health Belief Model both emphasize individuals' social and cognitive processes, such as beliefs and norms, the Theory of Planned Behaviour adds social factors to this and the self-regulatory model views individuals as active problems solvers in relation to their illness and does not assume logical information processing in the way that the HBM and other cognitive models do, however it does assume that individuals have the capacity for self-reflection in order to contemplate their actions and possible consequences, which may not always be true.

It is notable that several of the models examined so far often overlap in the constructs they propose. LoC, for example, is hypothesised to be a key factor in understanding 'outcome expectancies' in Social Cognitive Theory; LoC also presents itself in the 'perceived control' component of the Health Belief Model and again in the TPB (perceived behavioural control). Control is also an aspect of illness representation measured in the self-regulatory model. Behavioural intentions and perceived outcomes of action/behaviour are other concepts that can be seen running through these models, as in the HBM (perceived benefits and barriers) and in the TPB (outcome expectancies). The influence of social factors is evident in the TPB as 'social norms' and in Social Cognitive Theory as learning via observation. In addition the perceived behavioural control incorporates self-efficacy which can be

seen in the Health Belief Model, the Transtheoretical Model and Protection Motivation Theory.

Models such as the theory of planned behaviour and the HBM were developed as models to predict behaviours and models such as the transtheoretical model were developed to focus on the stages people pass through when attempting behaviour change. Despite this, Bosworth, Oddone and Weinberger (2005) note that although these models have different foci they do complement one another, as often it is the variables identified in the predictive models which act as indicators of change in the stage models.

As a result Bosworth *et al.* (2005) suggest these theories should be integrated and interventions aiming at increasing adherence to medical regime or healthy behaviours should focus on the factors identified across theories of behaviour change, as the combination of these elements may be better at explaining adherence than keeping models exclusive.

Cognitive and social cognitive models of health behaviour have so far not been as successful at predicting behaviours as people once hoped. In fact Sutton (1998) suggested that these models only predicted 40-50% of the 'variance in behavioural intentions'. In the reviewed literature 'perceived control' is evident in most of the models and also appears to have the most predictive ability in relation to health behaviours. For this reason this factor will be examined in more detail, in addition to other factors hypothesized to be important in predicting health behaviour.

1.10.1 Perceived control

As noted above, perceived control is one concept that is consistently included in many theories of health behaviour. Thomson & Spacapan (1991) note that perceived control is related to a number of constructs including: the ability to cope with stress, moderating pain, emotional well-being and behaviour changes. They argue that personal control is effective in predicting health behaviours because it acknowledges that people 'need to feel efficacious in order to decide to make behaviour changes' i.e. they need to believe they have the skills to carry out the required changes. This construct also incorporates the concept of 'learned helplessness' (Abrahamson, *et al.*. 1978; Seligman, 1975) and the idea that feeling helpless leads to fewer efforts to change your situation, thus a sense of poor personal control can lead to apathy that in turn leads to fewer attempts to make positive changes.

'Perceived Control' is a psychosocial variable comprised of two components: 'locus of control' and 'self-efficacy' (Thompson & Schlehofer, n.d.). Perceived control is therefore the perception that you have the skills to enact effective responses (self efficacy) and the belief that your own actions control your outcome (internal control).

There are several debates regarding the utility of the perceived control concept. Firstly, perceived control can be viewed as either a general construct or a more specific one i.e. referring to '... a specific event that the individual might want to

achieve or avoid.’ (Thompson & Schlehofer, n.d, p.3). In light of this, condition-specific scales have been developed including the ‘Perceived Control of Diabetes Scales’ (Bradley *et al.* 1984; Bradley *et al.* 1990), which will be used in this study. Indeed the Perceived Control of Diabetes Scale has been found to be significantly associated with well-being, satisfaction with treatment and HbA1c levels in patients with Type-II diabetes (Bradley *et al.*, 1990).

Secondly, the relationship between perceived control and preventative health behaviours might be bi-directional. Assuming that perceived control influences health behaviours assumes we utilise information as rational information processors (a criticism highlighted in the discussion on cognitive models). However it is also possible, according to Archibald (1978) that health behaviours affect an individual’s sense of control, which then leads to further health behaviours. If a person exercises to prevent heart disease, for example, this may lead to an increased perception of control over their health which leads to an increase in that behaviour i.e. perceived control and health behaviours have a reciprocal relationship.

Another important acknowledgement is that perceptions of control may be influenced by demographic factors such as social class. Marmot (1978), for example, found that blue-collar workers have higher risk of heart disease. This may be related to their lower levels of exercise compared to white-collar workers. Allison (1991) suggests this may be caused by their relative lack of opportunity for control in the workplace (doing repetitive jobs with little autonomy or self-expression). Allison and Coburn (1985) found that this lack of opportunity for control affects attitudes and

beliefs which ‘spill over’ into non-work behaviour such as orientation and motivation for exercise. Thus structural influences also affect individuals’ ability to control their health.

Another example of the importance of social influences comes from research by Gatz and Karel (1993) suggesting that perceived control changes over the lifespan. The results from their 20 year longitudinal study indicate that control changed over time with the degree of internality (internal LoC) increasing from adolescence to middle age. This change was most notable in the period around the 1970’s to 1980’s. Grandparents (defined as 55-70 years old) were found to be more externally oriented at all times. However there were gender differences, with grandmothers being more externally orientated than grandfathers. The authors propose that the move towards internality in the younger groups reflected a societal shift at that time towards valuing autonomy and a self-improvement ethos.

1.10.2 Perceived Control in Chronic illness

Perceived control has been studied in relation to a number of chronic illness conditions. It has been found to be associated with better health status, improved asthma-related quality of life, fewer hospitalisations and less restricted activity levels for patients with asthma (Calfee *et al.*, 2006). In relation to older adults it is suggested that perceived control should be examined in respective age groups of the old-old and young-old. This difference is important as studies such as Menec & Chipperfield (1997) have found that a greater sense of control was associated with

functional status, lower rates of hospitalisation and mortality in the old-old (defined as 80 + years old) but not in the young-old (65-79 years old).

In patients who experienced coronary events research has demonstrated that perceived behavioural control predicts fitness and activity levels in patients 12 months post hospitalisation (Allan *et al.*, 2007), suggesting perceived control needs to be targeted by health prevention programmes. This study also found that the perceived control construct was not mediated by depression and instead was independent in its impact upon fitness and activity levels. The theme of fewer hospitalizations has been investigated further in a study by Chipperfield and Greenslade (1999). They found that older adults with arthritis who report low levels of perceived control made more frequent use of health services than a matched sample who reported high levels of perceived control. It is possible of course that this could be a bi-directional effect, in that attending more regular hospital appointments leads to a lowered sense of control over health or that those with a lower sense of control make more use of hospital appointments.

In addition, Bosma *et al.*. (1999) studied the effects of perceived control on socioeconomic inequalities in mortality (n=2462, age range 25-74 years) and found that low levels of perceived control were related to low socioeconomic groups and higher rates of mortality. Most notably, they found that people scoring one standard deviation higher on the measure of perceived control (demonstrating lower perceived control) had a 1.45 times higher risk of mortality.

These studies suggest that perceived control has a strong association with a number of chronic illnesses such as asthma. A relationship has also been found with health behaviours such as fitness/activity and hospitalisations. The literature once again highlights the need to examine older adult groups rather than one homogenous sample. For these reasons it is important to examine its relationship with diabetes in more detail.

1.10.3 Perceived control and diabetes

There is mixed evidence in the importance of perceived control in relation to metabolic control in patients with diabetes. An American cross-sectional study of older adults with Type-II diabetes by Wallhagen (1999) found that perceived control related significantly to a number of health constructs including mental health, social and physical functioning and general health perception but did not relate significantly to metabolic control. In contrast, a more recent study by Lange and Piette (2005) found a significant relationship between perceived control of diabetes, diabetes related worries and HbA1c levels. They also found that depression affects personal appraisal of diabetes control leading to false beliefs. For example, the researchers found that people with depression made overly negative appraisals of their diabetes control when it their control was actually acceptable. In contrast, those without depression were more likely to make positive appraisals of their diabetes control when their control was actually poor.

More specifically, Wallston and Wallston (1978) developed a typology system to categorise types of perceived control. They suggested that 'believers in control' (those with high levels of perceived medical and personal control and low levels of perceived situational control) would be most successful at coping with chronic illness. Bradley *et al.*, (1990) applied a diabetes specific measure of perceived control which gave measures of personal, medical and situational control. These can be categorised according to the Wallston and Wallston (1978) typology as follows: 'believers in control' (high levels of perceived personal and medical control), 'pure internals' (high levels of perceived personal control, low situational and medical control) 'pure powerful others externals' (high levels of perceived medical control, low personal and situational control), 'pure chance externals' (high levels of perceived situational control, low personal and medical control), and lastly 'double externals' (high levels of perceived medical and situational control and low personal control). They found evidence to support Wallston and Wallston's (1978) theory, in that, those fitting the 'believers in control' type had the best blood glucose control. Specifically they found that 'believers in control' had the best HbA1c levels, followed by 'pure internals', 'pure powerful others externals', 'pure chance externals', and lastly 'double externals' who had the worst HbA1c levels

A study by Gillespie (1989) also found significant relationships between a strong belief in situational control and poor HbA1c levels ($r = 0.40$). This association was repeated in a study by Bradley *et al.*. (1990) investigating Type-II diabetes. In addition they also found a significant association between personal control and

HbA1c ($r = -0.14$) with patients reporting high levels of personal control having significantly better HbA1c levels than those with low personal control.

In summary, the evidence available confirms that associations have been established between the perceived control variable and mental health, social/physical functioning and general perceptions of health. On the whole, conflicting results have been found in relation to its relationship with glycaemic control. Some of this variation can be attributed to methodological shortcomings, importantly when studies do employ a diabetes specific measure they often produce strong evidence that perceived control affects HbA1c levels. In light of this the present study will use a condition specific measure to examine perceived control in relation to glycaemic control (as mediated by self-care).

1.10.4 Knowledge of Diabetes

According to the HBM a lack of understanding of treatment plans and lack of knowledge regarding diet can be identified as barriers to effective self-management of diabetes (Nagelkerk *et al.*, 2006) whereas the presence of knowledge is hypothesized to act as a cue to action. Bayliss *et al.*, (2007) found that individuals' lack of knowledge regarding their illness is associated with 'lower perceived health status' and reduced physical functioning.

Educational interventions for patients with chronic illnesses are popular in health service settings yet the evidence regarding their relationship to health behaviour

change is questionable. In relation to coronary heart disease, educational interventions often include 'information about cardiac disease, its treatment and the need to change behaviour to reduce the risk of the disease' (Bennett, 2000, p.206). However studies such as Wrisley & Rubenfire's (1988) found no significant difference in dietary change in a comparison of patients, who had high cholesterol following myocardial infarction, which either received or did not receive educational programmes. In relation to coronary heart disease (CHD), Gomel *et al.* (1997) found that workers identified as having risk factors for CHD were less likely to make health related behaviour changes after receiving an educational programme compared to those given behavioural counselling.

1.10.5 The role of knowledge in diabetes management

A systematic review of the literature by Norris *et al.* (2001) provided evidence that the effectiveness of education programmes designed for diabetic patients differed depending on the nature and delivery of the information. They found that 'collaborative' and 'interactive' educational programmes were more effective at inducing behaviour change than the traditional 'didactic' methods. They also found inconclusive results regarding metabolic control, as some of the studies reviewed in this paper found that an improvement in metabolic control was associated with an increase in knowledge whilst other studies demonstrated either an increase in knowledge with no corresponding improvement in metabolic control. These authors conclude that although knowledge may be important in changing health-related

behaviours other factors such as motivation and concordant beliefs are also required for change to occur.

It is possible that the timing of educational interventions is an important factor. Indeed research by Abouritz *et al.* (1994) found that the relationship between knowledge and metabolic control was mediated by duration of the illness. In this examination of a patient education programme they found that in patients who had a diagnosis of diabetes for less than two years, HbA1c levels improved in tandem with improved knowledge scores. Just four months after the programme ended, their knowledge decreased whilst their improvements in HbA1c levels were maintained. In contrast, improvements in knowledge and HbA1c were maintained throughout the 12 month follow-up period in patients who had received a diagnosis of diabetes more than two years prior.

In contrast, Persell *et al.* (2004) found that diabetes specific knowledge correlated with self-care activities but not with HbA1c levels. Most significantly they found that a one point increase on their measure of knowledge related to adherence to a diabetes specific diet, exercising a minimum of three times per week and the self-monitoring of blood glucose levels several times per week. Despite this, knowledge did not correlate with improved glycaemic control (HbA1c).

In contrast, a meta-analysis of 20 diabetes studies addressing the use of self-management/educational groups in older adults (Chodosh *et al.*, 2005) found a statistically significant difference in the self-management/educational group

compared to the control group in relation to the HbA1c outcome measure (effect size of -0.36). This effect size is equal to a reduction in HbA1c of approximately 0.81%; a reduction of this size is significant in relation to reducing cardio-vascular mortality. Despite this positive finding in favour of the educational intervention, the authors acknowledge that this may be partly due to publication bias rather than just the strength of the results.

There is evidence to suggest that knowledge has an association with self-care yet there is some dispute as to whether or not this is reflected in HbA1c levels. It is also acknowledged that although knowledge plays a role in behaviour change this relationship may be mediated by other factors such as beliefs and motivation. This study will investigate the predictive ability of knowledge in relation to HbA1c as mediated by self-care, and compare the relative contribution of this variable to other psychological factors such as perception of control over health.

1.10.6 Acceptance

Acceptance is a factor that has only recently been considered to be of importance in health behaviour research. Acceptance can be viewed as a cognitive/behavioural approach which contrasts with the emphasis upon the role of self-efficacy that is so evident in previous health/illness behaviour theories (e.g. HBM).

Acceptance has been brought to the attention of researchers recently as an integral part of the Acceptance and Commitment Therapy (ACT) model (Hayes *et al.*, 1999).

ACT is seen as a ‘third wave’ behavioural therapy (Harris, 2006). In the 1950’s and 1960’s the first wave of behavioural therapies were introduced. These focused on overt behaviour change using techniques based on operant and classical conditioning principles. Following this, the second wave introduced in the 1970’s meant the inclusion of cognitive interventions. This development led to the use of Cognitive Behaviour Therapy (CBT), as we now know it (Harris, 2006). The most recent developments have led to the so-called third wave of behavioural therapies. These include Acceptance and Commitment Therapy (Hayes, 2004), Mindfulness Based Cognitive Therapy (Segal *et al.*, 2002), Dialectical Behavioural Therapy (Linehan, 1993a, 1993b) and Functional Analytic Psychotherapy (Kohlenberg & Tsai, 1991).

One of the main differences between ACT and CBT are the beliefs about symptom reduction. Hayes *et al.* (1999) argue that traditional psychotherapies (such as CBT) are aimed at controlling thoughts and feelings as this is believed to be the key to a successful/happy life. In ACT, efforts at symptom reduction are reduced in favour of directly increasing behaviour towards valued life domains. Here a reduction in symptoms is not a goal of therapy as this theory posits that the attempt to reduce symptoms is often the cause of the problem (Harris, 2006).

ACT developed from research into human language and cognition (i.e. Relational Frame Theory, RFT). Based on RFT, ACT suggests that, as soon as we label an experience a ‘symptom’, it becomes a problem or more of a problem than it already was because ‘... a ‘symptom’ is by definition something ‘pathological’; something we should try to get rid of.’ (Harris, 2006, p.3). Therefore through the use of ACT

based interventions a patient is helped to change their view of feelings and thoughts in order to not view them simply as symptoms but rather to view them as transient events, which despite being uncomfortable are harmless. ‘Ironically it is through this process that ACT actually achieves symptom reduction – but as a by-product and not the goal.’ Harris (2006, p.3).

Traditional Western psychology assumes ‘healthy normality’; that is, that humans are psychologically healthy and given the right environmental factors humans will be happy and content. A priori therefore any psychological malaise is abnormal. ACT reverses this theory and assumes that the human mind is in fact destructive and creates suffering. Thereby the assumption of ‘destructive normality’ becomes the norm, as evidenced by the high rates of mental illness and suicidal thoughts.

ACT argues that we tend to become ‘fused’ with our cognitions’. So that traditionally in order to challenge and change our thoughts we use language which in effect reminds us that there is a problem, for example, the rule ‘I mustn’t think about washing my hands’ for a patient with a diagnosis of OCD creates thoughts about hand washing. Instead ACT suggests that when faced with difficult private events we could use acceptance and mindfulness to create increased psychological flexibility whilst still pursuing our chosen values.

Based on this premise ACT suggests we need to develop six core principles in order to develop psychological flexibility. These are: defusion, values, contact with the present moment, acceptance, the observing self and committed action. These

strategies aim to 'create a rich and meaningful life, while accepting that pain inevitably goes with it.' (Harris, 2006, p.2).

There is still some debate as to whether ACT based interventions are as effective as the first wave therapies (CBT). Corrigan (2001, p.192) argues that third wave therapies as a whole are in danger of 'getting ahead of the data' and suggests that they may not be as empirically valid as CBT. In support of this suggestion is a recent meta-analysis by Ost (2008), which compared third wave therapies (defined as ACT, DBT, CBASP, FAP & IBCT) with CBT. In this review Ost (2008) found that the Randomly Controlled Trial (RCT) methodology used in research for third wave treatments was of a poorer quality compared to that employed in CBT RCT research. He also found that none of the third wave therapies examined met the 'criteria for empirically supported treatments' according to the criteria set out by the APA Division 12 Task Force (Chambless, 2001). Despite this Ost (2008) did find significant effect sizes for both ACT and DBT (both moderate in size, 0.68 and 0.58 respectively).

1.10.7 Acceptance in chronic illness

The concept of acceptance has been examined in relation to various chronic illnesses most notably the area of pain. In this case the theory suggests that continued attempts to control pain can lead to further distress for the patient. Instead individuals need to accept aspects of the problem and in doing so they will reduce their attempts to control unwanted thoughts and feelings and can focus on important actions that are in

line with their values (McCracken *et al.*, 2004). The aim of acceptance in this realm is to have a willingness to experience pain in order to make moves towards a new positive course of action. In a move away from theories of self-efficacy, acceptance does not include judging pain as something you can manage or, conversely, as a positive experience (McCracken *et al.*, 2004). Through acceptance patients learn to view their thoughts and feelings as one element of their situation and therefore these thoughts and feelings are seen as transient and not necessarily guiding them towards helpful actions. On this basis patients can make choices, choices to experience pain whilst still taking valued actions towards personal goals.

McCracken (1998) found that independent of the intensity of pain, acceptance of pain is positively related to: a) a decrease in the reporting of pain b) reduced avoidance c) improvements in mood and d) reduced level of disability. These results were replicated in a prospective study looking at levels of acceptance of pain at time one and patient functioning at time two. Those who had higher levels of acceptance at time one had better functioning at time two (McCracken & Eccleston, 2005). In line with the theory, intense avoidance of chronic pain is positively associated with an increase in distress and disability (McCracken *et al.*, 1996).

There is also some evidence that ACT concepts apply to patients with epilepsy. Lundgren *et al.* (2006) applied a nine hour ACT intervention to a small (n=27) south African population which was found to significantly reduce the number epileptic seizures experienced over the following year and also improved personal well-being, life satisfaction and quality of life at one year post treatment (in comparison to a

placebo group). Latterly Lundgren *et al.* (2008) have re-examined the data from the original study in order to establish whether it is the ACT process factors that are the mediators of these changes in epilepsy. Through mediational analysis the researchers established that the ACT process measures significantly mediated the changes seen in the total number of seconds each seizure lasts (from pre-treatment to post-treatment follow-up).

Despite this evidence, Lundgren *et al.* (2008) identify a number of limitations which need to be acknowledged. Mediation is not the same as causation and therefore even though the present study increases the strength of the ACT model in relation to behaviour change, the ACT processes cannot be explicitly seen as the cause of change. In addition, the population studied is quite unique (low socio-economic South African inpatients or day workers), thus limiting our ability to generalise from these results to other populations. They conclude that despite these limitations the ACT process variables contribute to behavioural health and health change and as a result they are worthy of further research investigation.

The idea of using acceptance to help people with diabetes manage their condition has only recently been attended to.

1.10.8 Acceptance in Diabetes

Research by Richardson *et al.* (2001) found that lower HbA1c levels were significantly related to acceptance of diabetes and acceptance of diabetes related

cognitions'. A more recent study involving 81 patients with Type-II diabetes found that more patients who received ACT based interventions rather than educational interventions demonstrated good diabetic control (Gregg *et al.*, 2007). The acceptance component of this intervention included teaching patients to experience difficult thoughts and feelings about their illness rather than trying to challenge or avoid them. Gregg *et al.*, (2007) adapted the pre-existing Acceptance and Action Questionnaire so that it specifically related to the experiences of a person with diabetes (becoming the Acceptance and Action Diabetes Questionnaire (AADQ), alpha 0.94). Using this questionnaire and a measure of HbA1c levels (with less than 7% indicating good control) they found that the education plus ACT intervention resulted in significant improvements when compared to the education interventions alone.

This study has several strengths; firstly it was a randomised trial, with a large enough sample to reach power of 80%. The participants assigned to each group (education alone or ACT group) were matched in demographics and the primary care provider who continued to engage with the participant post-treatment was blind to the treatment group of the patient, thus limiting interference effects in the post-treatment period. Unfortunately it is impossible to completely control for this last factor, as participants may well have discussed their treatment with their primary care provider, which could have effected changes made in the post-treatment, pre-follow up, phase of the study. In addition only one therapist delivered the ACT intervention, which is a limitation according to Ost (2008) as 'in order to avoid a confounding

therapist and treatment condition it is necessary that treatment is delivered by more than one therapist' (p.306).

In summary, ACT is a relatively new therapeutic approach. It has been applied across a number of settings including physical health and behaviour change. The evidence indicates that acceptance is an important component of pain management and is associated with avoidance, mood, reported pain and disability and that ACT processes are significantly related to the number and duration of epileptic episodes. Within diabetes there is very little established research, although the current literature suggests that ACT and specifically 'acceptance' have an important function in relation to self-care and most notably glycaemic control. It is of note that these studies often have methodological shortcomings; nevertheless the research indicates acceptance has some role to play within health behaviour change, which is worthy of further investigation.

1.10.9 Depression and Chronic illness

As we have seen in previous models (e.g. self-regulatory model, Leventhal, Meyer & Nerenz, 1980) emotional state is hypothesized to influence health behaviours. Depression has been recognised as an influential factor in the outcome of chronic illness, affecting both the course of the illness and mortality rates (Cassano & Favo, 2002). Unfortunately depression is often unrecognised and under-treated, especially in patients with chronic illness, perhaps because symptoms of the illness often mirror those of depression, e.g. fatigue, low motivation and appetite disturbance.

The evidence suggests that in hospitalised older adults with acute illnesses those with depressive symptoms deteriorate at a faster rate than those without and that they are less likely to improve both as inpatients and/or upon discharge (Covinsky *et al.* cited in Cassano & Favo, 2002). Estimated rates of co-morbidity of depression and chronic illness range from 64% to 71% irrespective of medical setting (Wells *et al.*, 1991). The link between increased cardiac disease and mortality is strongly associated with the presence of depression. A study by Penninx *et al.* (2001) found an increased risk of cardiac mortality in populations who have a diagnosis of depression but no current cardiac disease, suggesting that mood disorder has a clear impact on physical health status. Associations between depression and increased risk of mortality have also been identified in other health conditions such as cancer (Pirl & Roth, 1999) and diabetes (Black & Markides, 1999). In addition to increased risk of mortality, Katon and Ciechanowski (2002) report that the medical costs of patients with chronic illness (in this case diabetes) increase proportionally in relation to severity of their depressive symptoms. Research has also found associations between the severity of the depression, diet and adherence to medical regimes (Cassano & Favo, 2002).

Katon and Ciechanowski (2002) attempt to explain the mechanism by which depression affects chronic illness, by suggesting that non-depressed patients habituate to the symptoms of their illness, until those symptoms become extreme and significantly impinge on functioning. In contrast, they argue patients with co-morbid depression do not adapt or habituate to the symptoms of their illness and instead there is an increase in the reporting of medical/physical symptoms.

In support of this, an American cross-sectional study by Walker *et al.* (1996) found that patients with psychiatric disorder (depression/anxiety) and inflammatory bowel disease (IBD) reported significantly more gastrointestinal and medically unexplained symptoms compared to a matched control group of people with IBD without psychiatric diagnosis. The psychiatric group also reported a greater decrease in health perception, vocational, physical, and emotional role functioning despite having similar severity of IBD to the non-psychiatric group. They also reported higher incidences of past abuse and victimisation. The authors suggest that early adverse experiences such as these may lead to a sense of powerlessness and lack of control, which according to Walker *et al.* (1996) ‘...increase a patient’s passivity and diminish the use of healthy, assertive coping behaviors critical to the management of interpersonal relationships and medical disorders’ (p.227).

There are several criticisms of this study worth noting including its lack of power, (with only 14 participants in the psychiatric group and 26 in the non psychiatric group). In addition, the disease severity ratings used by the researcher were designed for the study and therefore not independently validated. Perhaps most importantly, the participants were recruited from tertiary care settings which, by definition, are more likely to have patients with complex psychological difficulties, therefore the reporting of psychiatric symptoms may be over represented compared to the general (primary or secondary care) population.

Katz (1996) suggests that depression leads to reduced concentration, energy, perceived efficacy and reduced social interactions which lead to a reduced capacity for self-care in the face of chronic illness. Katon and Ciechanowski (2002) also note that depression leads to negative appraisals of self-care, which are associated with poor adherence to medical regimes. A meta-analysis of 12 depression and health studies and 13 anxiety and health studies by Dimatteo *et al.* (2000) found little relationship between anxiety and adherence to medical regimes but did find a more significant one (average effect size, -0.27) for depression and adherence, however there was a large amount of variation (effect sizes ranged from 0.00 to -0.48). They found that patients with depression were up to three times more likely not to adhere to medical regimes than those without. In addition to non-compliance with medical regimes, people with depression are less likely to engage in lifestyle activities associated with good health. After a coronary event such as a heart disease for example, depressed patients are less likely to engage in exercise, which ultimately increases their risk for future health problems (Allan *et al.* 2007). Cohen and Rodreguez (1995) proposed a four-factor model to explain the relationship between chronic illness and depression in older adults. They argue that depression affects chronic illness via biological, cognitive, social and behavioural pathways.

Investigations into the converse relationship looking at the impact of the chronic illness on depression are under-researched, yet this appears to be mediated by adjustment to illness and fluctuations in illness severity (Cassano & Favo, 2002). Cohen and Rodreguez's (1995) model also attempts to explain this relationship. They argue that certain illnesses may have a biological impact that causes depression e.g.

vascular depression. Secondly, via the behavioural pathway they suggest that depression results from poor coping mechanisms. Thirdly, perceived lack of control over illness and the effects of stress are identified as cognitive causes of depression. Fourthly they argue that chronic illness may lead to impoverished social networks, which then impacts upon mood (social pathway).

1.10.10 Depression and Diabetes

Specific links have been found between diabetes and depression. A meta-analysis of 26 studies of adults with diabetes (six studies of patients with Type-II diabetes and ten mixed studies (Type-II and Type I diabetes) by Lustman *et al.* (2000) found an association between depression and glycaemic control, however the effect size was small (0.17). They also found that a reduction in depression is associated with an improvement in glycaemic control (correlation of 0.46). A study of adults with diabetes by Lin *et al.* (2004) found that patients with major depressive illness and diabetes had poorer adherence in taking prescribed medicines than those without major depression. They also found an increased incidence of smoking, poor diet and lack of exercise in those with major depression. Other studies have found that even the presence of low-level depressive symptoms rather than major depression is associated with non-adherence to self-care in patients with diabetes (Gonzalez *et al.*, 2007).

The idea that depression results from diabetes has also been explored. Rubin (2000) argues that patients with diabetes are often trapped in a cycle of having low

glycaemic control and increased risk of complications that leads to reduced quality of life which in turn leads to poor attitudes towards self-care and fewer self-care behaviours, culminating in low glycaemic control (and so on).

The converse relationship of depression causing diabetes has also been investigated. A recent meta-analysis of nine studies found that the risk of developing Type-II diabetes in adults with depression is 37% higher than in non-depressed populations (Knol *et al.*, 2006). A review of the literature by Talbot and Nouwen (2000) found that hyperglycaemia resolves when depression is treated. They also found support for the hypothesis that the presence of depression increases the risk of developing Type-II diabetes. They hypothesise that this is due to the biological impact that depression has on the body, in that it increases the body's resistance to insulin and therefore reduces uptake of glucose. They propose that these metabolic changes may unbalance the systems of people already at risk of developing Type-II diabetes. Again, it is important to acknowledge the possibility that the effects of depression are not just biological but also behavioural and that those with depression may be less motivated to make healthy behavioural/lifestyle choices which then leaves them more susceptible to developing illnesses such as Type-II diabetes.

Cohen *et al.* (1997) found support for the hypothesis that depression accelerates diabetes complications. In this study retinopathy was more prevalent in patients with diabetes who have histories of affective disorders than those without. A large meta-analysis (27 studies, N=5374) by de Groot *et al.* (2001) found a significant association between diabetes complications, such as retinopathy, neuropathy and

macrovascular complications and depression in adults with Type I and Type-II diabetes. Examining only the studies looking at patients with Type-II diabetes this association had a moderate effect size (0.27).

There is clear evidence that emotional distress, notably depression, is associated with chronic illness onset and course. What remains unclear are the mechanisms by which this occurs, these questions are of interest, yet remain out with the scope of the current study. Within the diabetes literature, research suggests that diabetes may cause depression and that those with depression who develop diabetes may have poorer illness trajectories and glycaemic control (due to poor self-care) than those who are not depressed. Associations between depression and glycaemic control have been found in several studies; however the effect sizes have often been small. This study plans to compare the predictive ability of emotional distress (anxiety and depression) in relation to HbA1c levels (mediated by self care) in relation to other psychological factors discussed throughout this introduction.

1.11 Goals and unique contribution of the present study

The SIGN guidelines (2001) note that tight glycaemic control is important for minimising the risk of further health complications in people with diabetes. The UK Prospective Diabetes Study Group trial 38 (1998) found that tight control of blood pressure in patients with Type-II diabetes results in a clinically significant reduction in: the risk of deaths related to diabetes, complications related to diabetes, progression of diabetic retinopathy and deterioration in visual acuity. A review of the

Scottish Diabetes Framework published by the Scottish Executive (2004) suggests that empowering people with diabetes to manage their own care should be a priority in any high quality diabetes service. Research into health behaviour indicates that the success of self-care, facilitated by professionals, will depend to a large extent on individual factors.

Several factors have been identified in the literature as being influential in improving self-care and blood glucose control in diabetic populations; these include perceived control, emotional distress and acceptance. There is mixed evidence regarding the relationship between knowledge and self-care/blood glucose control. Many of these factors have been looked at individually making it difficult to directly compare the effects of one to another. This study aims to directly compare these factors in relation to their role in diabetes management.

As discussed earlier, older adults are traditionally an under researched population and, as a result, the majority of the evidence examined throughout this introduction has been carried out with adults (up to 65 years old). Despite this, older adults are the fastest growing age group in the western world. They are also the group with the largest predicted increase in diabetes, which makes it important that this study is carried out with this population.

Few researchers have investigated the interactive effects of the proposed factors, and none (to the author's knowledge) have investigated these in relation to older adults, making this a novel exploratory study.

1.12 Implications

It is hoped that this study will add to the existing literature in health-behaviour regulation and diabetes. This may then be used to aid the design and implementation of interventions aimed at improving diabetes management for older people. In addition, it is hoped that this study will add to the existing literature on preventative health programmes by highlighting factors which strongly influence self management, and therefore need close monitoring by health professionals and public health efforts in order to prevent declines in health.

In relation to interventions, the factors identified by this study as being most influential in self-management may be targeted by therapists in order to bring about health-related behaviour change. I.e. by facilitating an improved sense of control, reduced symptoms of depression/depressive cognitions, improved knowledge about diabetes and/or increased acceptance of diabetes.

1.13 Aims of study

This study has several aims; to test the extent to which perceived control can be used to model variation in diabetes control in older adults, to test the extent to which the acceptance of diabetes and diabetes-related cognitions can be used to model variation in diabetes control in older adults, to test the extent to which the knowledge of diabetes can be used to model variation in diabetes control in older adults, to test the

extent to which emotional distress can be used to model variation in diabetes control in older adults and to model how the above psychological factors interact and influence self-care and thence glycaemic control.

1.14 Hypotheses

H1: Higher levels of perceived personal control, diabetes knowledge and acceptance of diabetes will be predictive of a decrease in HbA1c, mediated by good self-care

H2: Higher levels of emotional distress, perceived medical control and perceived situational control will be predictive of an increase in HbA1c levels, mediated by good self-care.

2. Method

2.1 Design

A cross-sectional, questionnaire based design was used to test the hypothesised relationships between the predictor variables: perceived control, emotional distress, knowledge of diabetes, acceptance, self-reported self-care and the criterion variable of HbA1c level.

2.2 Statistical Power

The planned examination of the questionnaire data involved using path analysis, which involved a set of standard multiple regressions. There was a maximum of six predictor variables in the analyses. There are several ways of calculating the number of participants required to achieve statistical power.

Green (1991) suggests using the calculation $N=50+8m$ (where m is number of predictor variables). Based on this calculation a minimum of 98 participants would be required for the analysis. Cohen's power primer (1992) indicates that minimum of 97 participants are required with six predictors to achieve a medium effect size, with alpha 0.5 and power of 0.8. Based on these calculations, it was decided that a minimum of 98 participants would be required for analysis to demonstrate a medium effect size.

2.3 Ethical consideration

The Lothian panel of the National Research Ethics Committee granted ethical approval for the study. The study was also approved by Lothian Research and Development Offices. The main ethical consideration for the study was that patients may be identified by the Hospital Anxiety and Depression Scale as having mental health difficulties. However the data for this questionnaire was taken from pre-completed questionnaires administered routinely by clinic staff on the day of the research. Therefore clinic staff would have already have identified any mental health concerns and be communicating this information to relevant services.

The study itself was unlikely to cause any undue distress or discomfort. All participants were informed that they could withdraw from the study at any time should they want to and that this would not affect their current level of care. All participants were also informed that their data would be given anonymous codes for the purpose of data analysis.

2.4 Participants

Participants were recruited from the outpatient diabetes clinic at one general hospital in West Lothian. All participants were over 65 years old diagnosed with Type-II diabetes. Participants were excluded if they did not have sufficient English to understand the questionnaires as non-English language versions were not available.

202 participants were sent information packs (Appendix A) about the research and data collected by the researcher at their clinic appointments over a 5 month period. 81 out of 202 individuals participated in the study (40% response rate).

2.5 Recruitment/confidentiality

The clinic database provided home addresses of all potential participants who fulfilled the inclusion criteria. Potential participants attending routine clinical appointments were then sent an information leaflet detailing the study (Appendix A), with their reminder appointment letters by clinic staff, a minimum of 36 hours prior to their appointment. Members of the clinical team then identified potential participants at the clinic as they attended for their routine check-up and asked them if they wished participate in the study.

The information leaflets sent to potential participants included an outline of the research aims and methodology. It was highlighted on the information sheets that participants could contact the chief investigator and/or research supervisors, should they have any further questions about the study or in the unlikely event they become distressed during completion of the questionnaire.

The information sheet informed potential participants that taking part in or refusal to take part in this study would not impact upon their current treatment or care.

All the participants were given the option of requesting a copy of the study's findings.

Each completed questionnaire was assigned an identification number and no identifying information was included on the computer database. All consent forms and questionnaires were kept in a secure cabinet in the hospital psychology department.

2.6 Inclusion criteria

The following inclusion criteria were used to identify potentially suitable participants from the clinic database who were then sent information packs about the study. In mental health settings older adults are defined as those over the age of 65 years old, as this research is aimed at older adults this was the cut-off age adopted for the study.

Research suggests patients with Type-I and Type-II diabetes often have different sets of health-related beliefs and self-care procedures (Bradley, 1994). In older adult populations a diagnosis of Type-II diabetes is more prevalent than Type I (see introduction). Therefore it was decided that this study would only look at participants with a formally recorded diagnosis of Type-II diabetes.

As there is a small body of research suggesting those in earlier stages of diagnosis have different health related psychological beliefs about their illness from those who

have a more established history of the condition, for this study a minimum time since diagnosis of three years or more was used.

2.7. Measures

Copies of all questionnaires are included in appendix B

Questionnaires were presented in the same order to all participants.

2.7.1 The Perceived Control of Diabetes Scale (PCDS) (Bradley, 1993)

This measure is designed to examine participants' perceived control over their illness. This scale is influenced by the early work on locus of control. However rather than only examining one dimension of control (internal vs external) measures of perceived control also examine other orientations such as perceptions of responsibility and foreseeability. This particular measure of perceived control has the advantage of being specifically tailored to diabetic populations.

This is a 35-item questionnaire providing three subscale scores. The measure was designed to have a similar format to Peterson *et al.*'s (1982) Attributional Style Questionnaire, i.e. a scenario is described then a space is provided for respondents to specify the most likely cause of the scenario, followed by a series of scales for rating the cause. The scales give ratings for attributions to internality, externality, chance, the doctor, the treatment, the patient and foreseeability. Composite scores are made by

summing together sets of subscales to form scores of personal control, medical control and situational control. The alpha coefficients for the composite scores are: Personal Control: 0.81, Medical control: 0.75, Situational control: 0.79 (Bradley *et al.*, 1990). The questionnaire also has good face validity. The only problem reported in a pilot study of the measure concerned the acceptability of the questionnaire when interviewers have been employed to administer it by reading the items to patients. Under these circumstances it was reported as taking much longer to complete and seeming 'longwinded and irritating'. For the purpose of this study participants were asked to self-administer the questionnaire.

This questionnaire also has concurrent validity: Bradley *et al.* (1990) applied Wallston and Wallston's (1978) Multiple Health Locus of Control typology to understanding individual differences in HbA1c in a sample of patients with Type-II diabetes and found that those categorised according to Wallston and Wallston's (1978) typology as 'believers in control' scored highly on Bradley's (1993) 'personal control' and 'medical control' composite scores and low on 'situational control'. These participants had the best HbA1c levels. Those who fit Wallston's 'double externals' scored highly on Bradley's 'medical control' and 'situational control' and low on 'personal control'. These participants had the worst HbA1c levels. Those fitting Wallston and Wallston's (1978) 'pure internals' scored highly on Bradley's 'Personal control' category. These participants had the second best HbA1c levels.

This questionnaire has also been shown to have good predictive validity. Bradley *et al.* (1987) found this measure of perceived control useful in predicting efficacy of

treatment in terms of blood glucose level for patients 12 months post-treatment (Type-I diabetes). In comparison, measures of health beliefs were not shown to significantly predict these outcomes. The measure has since been adapted specifically for people with Type-II diabetes. This adapted version of the measure has successfully been used to predict HbA1c levels (Bradley *et al.* 1990), with stronger perceptions of personal control being associated with lower HbA1c levels.

The full questionnaire was considered lengthy and in order to reduce participant burden and in line with discussions with the author of the measure it was decided that the six scales could be reduced to five without significantly jeopardising the validity of the scale. The reliability of this five scale version was subsequently examined (see results section for details). The scoring range each composite scale is 0-30, with higher scores indicating higher perceived control for that domain. As this scale was not designed for clinical use there are no recommended cut-off points. Previous studies report mean scores for each of the composite scales as follows: personal control 23.3 (S.D. 4.8), medical control, 12.6 (S.D 6.4), situational control, 6.9 (S.D. 5.9) (Bradley *et al.* 1990).

2.7.2 The Diabetes Knowledge Scale (DKN) (Dunn *et al.* 1984)

This is a 15 item multiple-choice questionnaire designed to measure levels of theoretical and practical knowledge about diabetes. This includes general diabetes care, food groups, basic physiology of diabetes, sick day management and hypoglycaemia. This measure has adequate internal consistency and reliability with

an alpha coefficient of 0.83 (Beeny, Dunn and Welch, 1994). Furthermore, the internal consistency of this measure has been tested separately for both insulin dependant and non-insulin dependant populations (alpha = 0.74 and 0.79 respectively) (Beeny, Dunn and Welch, 1994). The DKN scale was purposely designed for use with older adult populations. The scoring range for this measure is 0-100% with higher scores indicating greater levels of knowledge. This measure was not designed for diagnostic purposes and therefore has no recommended clinical cut-off points. Previous research using this measure provides normative data on the scale. The mean score on this scale in a study of older adults with non insulin dependent diabetes was 7.6 (S.D: 3.3) as a percentage provides a mean score of 32% (Campbell, 1991).

2.7.3 The Acceptance and Action Diabetes Questionnaire (AADQ) (Gregg *et al.*, 2007)

The AADQ is used to measure participants' acceptance of their diabetic thoughts and feelings and to indicate how much these thoughts and feelings interfere with 'valued action' (see introduction). This is an 11-item questionnaire developed by adapting the original Acceptance and Action Questionnaire (AAQ) 2004 version. The AAQ 2004 was a nine-item measure designed to measure experiential avoidance i.e. levels of acceptance. Data from several studies demonstrate that AAQ scores correlate with measures of various quality of life measures, including psychopathology. Various studies have demonstrated that higher levels of acceptance and value-based action (psychological flexibility) are associated with better future mental health and lower

probability of psychiatric disorders (Bond & Bunce, 2000, 2003; Donaldson-Feilder & Bond, 2004). In relation to chronic illness, McCracken (1998), using a pain-related modified version of the AAQ, demonstrated an association between psychological flexibility and better work status/ less disability in people with chronic pain. In addition, McCracken (2004) found a relationship between the same measure and 'fewer pain related health care visits.' The diabetes adapted version used in the present study has good internal consistency and reliability with an alpha coefficient of 0.94 (Gregg *et al.*, 2007).

The scoring range each composite scale is 0-77, with higher scores indicating higher levels of acceptance. As this scale was not designed for clinical use there are no recommended cut-off points. Previous studies of adults with Type-11 diabetes report mean scores of: 50.48 (S.D. 16.12) and 46.23 (S.D: 16.97) (Gregg *et al.*, 2007).

2.7.4 The Self-Care Inventory-Revised Version (SCI-R) (Greco *et al.*, 1990)

The SCI-R is designed to measure participants' self-reported self-care behaviours. This is a 12-item questionnaire looking at patients perceived management of their diabetes over the past one-two months. This measure was originally designed for use with patients with Type-II diabetes and has good internal reliability and consistency (Cronbach's alpha = 0.87) (Weinger, Butler, Welch and LaGreca, 2005). The SCI-R demonstrated concurrent validity when correlated to an existing measure of self-care with a correlation coefficient of 0.63. The SCI-R also has adequate construct validity, when correlated with diabetes related distress ($r=0.36$), self-esteem ($r=0.25$), self-

efficacy ($r=0.47$), depression ($r=-0.22$), anxiety ($r=0.24$) and HbA1c ($r=0.37$) (Weinger, Butler, Welch and LaGreca, 2005).

Scores are averaged and converted to a 0-100 point scale to provide a percentage score. Higher scores reflect higher levels of self-care. As this scale was not designed for clinical use there are no recommended cut-off points. Previous studies of adults with Type-II diabetes report mean scores for this measure as follows: 63 (S.D:21) and 64.4 (S.D: 17.9) Weinger *et al.* (2005).

Pre-administered measures

2.7.5 Hospital Anxiety & Depression Scale (HADS) (Zigmond & Snaith, 1983)

This is a 14-item questionnaire divided up into two subscales measuring depression and anxiety symptoms. The HADS avoids using items that measure physical manifestations of depression; as such items may lead to inappropriately elevated scores in populations suffering from medical conditions. The scale was developed for use in general medical out-patient clinics but is now widely used in clinical practice and research. The subscales demonstrate good reliability with reported Cronbach's alpha scores ranging from 0.77 to 0.86 (Crawford, Henry *et al.*, 2001). The scale is short, easy to use and has good face validity. This measure is administered by the diabetes clinic staff for all routine out-patient check-ups. As the participants in this study were attending such a check-up on the day of the study the

researcher was able to access the results of this questionnaire from the clinic database.

Total scores range from 0-42 for the entire scale, with ranges of 0-21 for the anxiety and depression sub-scales respectively. Higher total scores reflect higher levels of emotional distress. Clinical cut-off points for the individual sub-scales of anxiety and depression are scores of 8. This scale has also been used as a total composite score to detect emotional distress (Zigmond & Snaith, 1983; Hermmann, 1997). Research by Aben, Verhey, Lousberg, Lodder and Hoing (2002) found that use of the total score was no less sensitive at identifying depression (91.7) than use of the depression sub-scale alone. They found that the correlation between the anxiety and depression subscales was high ($r=0.67$, $p<0.001$). In this study they recommend a cut-off of 11 for the total scale score as an indicator of depression. Crawford, Henry *et al.* (2001) recommend that it is legitimate to combine the subscales of the HADS to produce a total measure of emotional distress. In their research study of the general adult population they report a mean total score for this scale of 9.82 (S.D: 5.98).

2.7.6 HbA1C (glycated haemoglobin)

HbA1c provides a measure of blood glucose levels as an indicator of diabetes control over the last two-three months. In the blood stream glucose sticks to the haemoglobin pigment forming A1c. Each red blood cell lives for 8-12 weeks. HbA1c measures how much glucose is stuck to the haemoglobin in the blood. A measure of HbA1c therefore provides a person's average blood glucose level over the past two-three

months. This provides a reliable measure of actual control over diabetes.. This measure is also administered by the diabetes clinic staff for all routine out-patient check-ups. As the participants in this study were attending such a check-up on the day of the study the researcher was able to access their HbA1c results from the clinic database.

There were six measures in total (the data for two of these were already collected by the clinic). Participants were asked to complete a total of 73 questions in likert scale format. These took approximately 15 to 20 minutes to complete.

.The NICE guidelines (2008) recommend a cut-off for adequate glycaemic control as HbA1c levels of $<7.5\%$. They recommend a population target of $\leq 6.5\%$. In individuals without diabetes HbA1c values typically range between 3-6.5% (Gregg *et al.*, 2007). In a recent large scale study of 1139 older adults (without diagnosis of diabetes) across England and Wales, the mean HbA1c level for the sample was 5.8% (Gao, Mathews, Sargeant, Brayne and MRC CFAS, 2008). The ACCORD research group (2008) recently examined HbA1c levels and their associated risks. Although the risks associated with very high HbA1c levels are well established in the literature (see pages 10-11 for discussion) the potential risks associated with very low HbA1c levels are still relatively unknown. This group of researchers found evidence to suggest that the risk of mortality increased significantly when HbA1c levels of below six percent were targeted in treatment. The DCCT (1993) found that for patients with Type-I diabetes hypoglycaemia occurred in 61 out of every 100 patient years. In contrast the rates for patients with Type-II diabetes are much reduced, in fact

hypoglycaemic events occur in three (females) or two (males) out of every 100 patient years (Cull, Wright, Macleod & Holman, 2001). In light of this it is important to note that the no participant in the present study had HbA1c levels below six percent. Therefore these results are valid for patients with HbA1c levels of six percent and above, as typified by the majority of experiences for patients with Type-II diabetes.

2.8 Data management

2.8.1 Screening data/Missing data

Of the 81 individuals who participated in the study, 30 did not complete the Perceived Control measure (38%) with several commenting that it was 'just too long', suggesting it lacked face validity with this population. In addition 21 emotional distress scores were missing (26%) from the clinic database. Through discussion with the clinic's senior consultant and by requesting and examining individual files it was apparent that the clinicians involved in these individuals' treatment had not carried out the HADS measure with their patients. As a result the study is underpowered for a multiple regression and the effects of this will be discussed throughout.

2.9 Statistical analysis

The data was collected and analysed using the Statistical Package for the Social Sciences (SPSS) Version 11 for Windows. Path analysis using multiple regression was planned to examine the predictive ability of each variable (moderated by self-care) within a path model, in accordance with Bramwell (1996). Initial path analysis revealed that none of the independent variables predicted the moderator variable of self-care, therefore the analytic plan was adjusted to carry out one multiple regression model instead.

2.10 Preliminary analysis

Preliminary analysis was carried out to check for outliers and to check assumptions of normality and lack of multicollinearity were met before commencing with the multiple regression (see results section for details).

3. Results

3.1 Total sample

81 out of 202 invited individuals participated in the study (40% response rate). No data was collected on those who chose not to participate in the research. As a result it is possible that the sample in this study may represent a bias in responding. The age range for the sample was 65 to 87 years old. In the total sample there was an approximately equal split between numbers of male and female participants (47% male, 53% female).

3.2 Age, time since diagnosis & HbA1c levels

The average age of the sample was 72 years old (SD = 5 years). 60.5% were aged 65-74 years old, 37% were 75-84 years old and 2.5% were aged 84 and over. The average time since being formally diagnosed (Type-II Diabetes) was 12 years (SD = 5.9 years). The mean HbA1c level for this sample was 7.8% (SD = 1.7).

Table 3.0 Means, standard deviations for age, duration since diagnosis and HbA1c Levels

	Age	Duration since diagnosis (years)	HbA1C Level
Mean	72	12.40	7.82
S D	5.05	5.87	1.68
Range	23 (64-87)	28 (1-29)	10.20 (4.7-14.9)
N	81	78	81

3.3 Descriptive Data

Table 3.1 presents the means and standard deviations for the Acceptance and Action Diabetes Questionnaire (Gregg *et al.* 2007), the Self-Care Inventory-Revised Version (Greco *et al.* 1990), the three subscales from the Perceived Control of Diabetes Scale (Bradley, 1993) (Personal, Medical and Situational control), The Hospital Anxiety & Depression Scale (Zigmond & Snaith, 1983), the Diabetes Knowledge Scale (Dunn, *et al.* 1984) and the HbA1c levels.

Table 3.1. Means and standard deviations (SD) for Acceptance (AADQ), Knowledge (DKN), Personal control (PC), Medical control (MC), Situational Control (SC), Self-care (SCI-R), Emotional Distress (HADS) and HbA1C

Variable	Mean	Standard Deviation
Acceptance (AADQ)	58.0	9.2
Self-Care (SCI-R)	69.6	11.6
Personal Control (PCDS)	21.3	6.8
Medical Control (PCDS)	10.7	7.0
Situational Control (PCDS)	7.1	5.2
Knowledge (DKN)	8.0	2.8
Emotional Distress (HADS)	11.0	5.9
HbA1C	7.8	1.7

The mean scores reported in this study for acceptance, self-care, personal, medical and situational control, knowledge and emotional distress are within one standard deviation of previously published research (see method section, pages 67-72, for comparison). The HbA1c levels reported in this study are as expected above those reported in previous research sampling the general population (without diagnosis of diabetes) (Gao *et al.*, 2008). Yet they are within one standard deviation of previously published research sampling community dwelling older adults with diagnosed Type-II diabetes (Shorr, Franse, Resnick, Di Bari, Johnson & Pahor, 2000). Therefore this sample appears to be representative of the population being studied.

3.4 Assessing the outliers

To examine the effect of any outliers in the data the standardised residuals have been examined. Less than 5% of the standardised residuals lie between - 1.96 and +1.96. Therefore 95% of the residuals are normally distributed.

Of the one case that had a standardized residual greater than two this was examined further to assess the influence it might have exerted on parameters of the model by using the Cook's distance statistic. This case does not have a value greater than one, suggesting it is of no concern (Field, 2005).

3.5 Checking assumptions

In order to establish the usefulness of the regression to the general population I checked assumptions of multicollinearity and the independence of the residual terms.

Multicollinearity was examined using the VIF statistic. Multicollinearity needs to be examined to avoid Type-II error, where a good predictor of the outcome is not detected and therefore gets rejected by the model. In this data there is no indication of multicollinearity i.e. the VIF values are all below 10 and all tolerance statistics are well above 0.2, as recommended by Bowerman and Connell (1990), and Menard (1995), respectively.

The assumption that errors are independent has also been met, with a Durbin-Watson statistic of 2.007.

3.6 Missing Data and the analytic plan

As there was a significant amount of missing data, once data was excluded using the listwise method $n=36$. In light of this correlations are reported instead of regression.

Table 3.2: Correlations

		SELFCARE	ACCEPT	PC	MC	SC	KNOW L	ED	HBA1C
SELFCARE	Pearson Correlation Sig. (1-tailed)	.	-.102 .277	.160 .176	.080 .322	.137 .212	.000 .499	-.240 .079	-.228 .090
ACCEPTANCE	Pearson Correlation Sig. (1-tailed)		.	-.136 .214	.007 .483	-.320* .029	.114 .255	-.133 .219	.300* .038
P CONTROL	Pearson Correlation Sig. (1-tailed)			.	.095 .291	-.055 .375	.048 .391	-.136 .214	-.116 .250
M CONTROL	Pearson Correlation Sig. (1-tailed)				.	.238 .082	.295* .040	.015 .466	-.313* .031
S CONTROL	Pearson Correlation Sig. (1-tailed)					.	.436* .004	.169 .163	.128 .229
KNOWLEDGE	Pearson Correlation Sig. (1-tailed)						.	-.172 .157	-.213 .107
E DISTRESS	Pearson Correlation Sig. (1-tailed)							.	.152 .189

* Correlation is significant at the 0.05 level (1-tailed).
a Listwise N=36

3.7 Hypothesis Testing

3.7.1 Hypothesis 1

Higher levels of personal control, diabetes knowledge and acceptance of diabetes will be predictive of a decrease in HbA1c levels.

There were no significant relationships between personal control or knowledge and HbA1c.

There was a significant positive relationship between acceptance and HbA1c, $r = .30$, $p < .05$.

3.7.2 Hypothesis 2

Higher levels of emotional distress, perceived medical control and perceived situational control will be predictive of an increase in HbA1c levels.

There were no significant relationships between emotional distress or perceived situational control and HbA1c.

There was a significant negative relationship between perceived medical control and HbA1c, $r = -.31$, $p < .05$.

3.8 Secondary analysis

3.8.1 Data was split into groups according to the age of the participant for further analysis.

In the 65-74 year old group (n=47) (young-old) There were no significant correlations with HbA1c and any other predictor variables (Appendix D, i).

In the 75-84 year old age group (n=29) (old-old) there was one significant relationship between HbA1c and self-care ($r = -.448$, $p=0.01$) suggesting that as self-care increases HbA1c levels decrease (adequate control) (Appendix D, ii).

In the 85+ age group (oldest-old) only two participants fitted this category and as such the numbers were too small for comparison.

An independent samples t-test was performed to compare differences in scores between young-old and old-old groups on all examined variables (time since diagnosis, self-care, acceptance, personal control, medical control, situational control, knowledge, emotional distress and HbA1c levels). There was one significant difference between the two age groups in time since diagnosis. As one might have expected those in the old-old group had a significantly longer time since being diagnosed with Type-II diabetes than those in the young-old group ($t= -2.102$, $p=0.039$) ((Appendix D, iii).

3.8.2 Data was also split into two groups for adequate (HbA1c of <7.5%) and inadequate glycaemic control (HbA1c of $\geq 7.5\%$), as defined by the 2008 NICE Guidelines.

In the adequately controlled group (n=42) there were no significant relationships between HbA1c and any predictor variables (Appendix D, iv). In the inadequately controlled group (n=39) there were no significant relationships HbA1c and any predictor variables (Appendix D, v).

An independent sample t-test was performed to compare differences in scores between adequate and inadequate control groups on all examined variables (time since diagnosis, age, self-care, acceptance, personal control, medical control, situational control, knowledge, emotional distress). There were no significant differences between the two groups for any of the variables (Appendix D, vi).

3.8.3 Gender

An independent samples t-test revealed no significant differences in any variables (self-care, acceptance, personal control, medical control, situational control, knowledge, emotional distress and HbA1c levels) between males and females.

3.8.4 Exploration of missing data

To explore the possibility that the missing data represents a response bias, data was reanalysed once it had been split into cases with full data sets (n=36) and data with incomplete data sets (n=45).

Means and standard deviations are reported for both groups in Appendix F. Independent t-tests reveal one significant difference between the two groups in terms of time since diagnosis (Appendix E). Those who had their diagnosis for longer were more likely to complete the questionnaires than those who had been diagnosed more recently ($t = -2.592$, $p = 0.004$). According to Cohen (1992), for independent t-tests, effects sizes (d) are defined as follows: 0.20 small effect size, 0.50 medium effect size and 0.80 large effect size. In light of this the strength of the effect size for this finding is only small 0.10 ($-2.952^2 / -2.952^2 + 76$). Of note, the mean HbA1c levels for both groups were equal at 7.80.

3.9 Reliability of the modified Perceived Control of Diabetes Scale

The original Perceived Control of Diabetes Scale (Bradley, 1993) had been reduced for this study from six subscales to five in order to reduce response burden. In order to establish the reliability of this modified version, Cronbach's alpha coefficient was calculated for each sub-scale. The results of which demonstrate adequate reliability:

The personal control sub-scale had an alpha coefficient of: 0.880. The medical control sub-scale had an alpha coefficient of: 0.790. The situational control sub-scale had an alpha coefficient of: 0.712

3.10 Summary

As correlations were reported instead of regression, predictive relationships between variables can not be examined. A significant positive correlation was found between acceptance and HbA1c and a significant negative relationship was found between perceived medical control and HbA1c.

Secondary analysis showed that there were no significant differences in scores (for the predictor variables) between young-old and old-old age groups. There were also no significant differences in scores (for the predictor variables) between those who had adequate blood glucose control and those who had inadequate blood glucose control.

4 Discussion

The overall aim of the study was to add to the existing literature examining the extent to which psychological factors can predict blood glucose control in older adults with Type-II diabetes. To date research has provided evidence that a number of psychological factors exert influence over patients' control of their diabetes and that if these factors can be identified and appropriately modified there could be a significant impact upon HbA1c levels. The majority of studies so far have focussed on glucose control in adult populations despite older adults with complex health problems becoming the fastest growing demographic in western countries (Wild *et al.*, 2004). The present study aimed to explore the predictive ability of perceived control, emotional distress, acceptance, knowledge and self-care in relation to a stable measure of blood glucose control (HbA1c).

In this section the results for each hypothesis are discussed and compared to previous research. Methodological limitations are considered together with theoretical and clinical implications of the results. Conclusions are made and directions for future research are considered.

4.1 Personal Control

The construct of perceived control over health has been found to be significant in predicting a number of health behaviours (e.g. asthma-related quality of life, Calfee, *et al.*, 2006), hospitalisation rates and health service use (Chipperfield & Greenslade, 1999), however in diabetes research the evidence has been more mixed. More recently the notion of different types of control assessed with condition specific measures have been examined (Wallhagan, 1999, Bradley *et al.* 1990) and the concept of personal control has been found to be predictive of lower HbA1c levels.

Although no predictive relationships could be examined by the present study, correlation based analysis found that personal control had no significant relationship with blood glucose control levels.

Interestingly most of the previous studies investigating this type of relationship have investigated adult populations. Therefore it is possible that for pure older adult populations perceptions of personal control are not an influential factor in their diabetes management. Personal control assessed with the measure used in this study provides a composite score of internality, patient control and foreseeability, high personal control scores are said to indicate patients who make good use of personal resources when faced with an illness (Bradley, 1994). This may explain why for this sample high levels of perceived medical control were predictive of lower blood glucose levels (adequate control) instead, suggesting that for older adult populations

reliance upon medical professionals instruction and intervention is more influential than taking a sense of personal responsibility for their illness.

The measure used to assess perceived personal control appeared to lack face validity (see missing data section) and as a result a large amount of missing data has led to the study being underpowered. In light of this it should also be considered that these results may be the result of inadequate sample size (Type-II error) (see section 4.10 for discussion).

4.2 Knowledge

To date there is a body of evidence suggesting that knowledge of the illness and its management relates to self-care in diabetes (Persell *et al.* (2004), however there is mixed evidence regarding its relationship with actual blood glucose control. The present study found no evidence to support the hypothesis that there is a relationship between knowledge and blood glucose control.

Surprisingly there was no significant relationship between self-care and knowledge either. This is interesting as one might hypothesize that in order to look after one's illness well you would need a certain level of knowledge regarding the nature of that illness. However this finding may suggest that having a good level of knowledge does not lead to good self-care, i.e. knowledge does not lead to behaviour change.

4.3 Acceptance

A significant relationship was found between acceptance and HbA1c, indicating that as acceptance goes up HbA1c levels also go up. This is in direct contrast to the predicted relationship, i.e. one would expect that as levels of acceptance increase HbA1c levels would decrease (improve).

Gregg *et al.* (2007) examined acceptance in patients with Type-II diabetes. Their study found that an acceptance and education based intervention led to significant improvements in blood glucose control. In addition a study by Richardson *et al.* (2001) found that lower HbA1c levels (indicating good blood glucose control) were significantly related to greater acceptance of diabetes. The sample in the study by Gregg *et al.* (2007) study was similar to the present study's sample, with a similar mean HbA1c level (within one standard deviation) and mean acceptance level (within one standard deviation) with both studies using the same measure of acceptance (AADQ, Gregg *et al.* 2007). The most notable difference between their sample and this one is the mean age. The mean age in the study by Gregg *et al.* (2007) was 51.9 years old whereas the mean age for the present study is 72 years old. In addition the Richardson *et al.* (2001) study also had a sample with a similar mean HbA1c level (within one standard deviation) however their mean age for the sample was 42 years old. This may indicate that the main factor causing a difference in the

processes and effects of acceptance is the age of the population being studied, i.e. the role of acceptance could be different in older adult populations with diabetes compared to adult populations.

The findings of the present study are in contrast to previous studies. However it is important to note that although research into the role of acceptance in other health conditions/behaviours (e.g. pain) is fairly well established, research into the role of acceptance in diabetes is in its infancy and as such the present findings may be of value.

It is important to consider whether the results are indicative of problems with the measure used in this study, i.e. it may have lacked face validity. Yet no participants commented on the scale during the data collection phase. Alternatively one may consider the findings to be a true reflection of these participants' state. If this is the case one possible theory might be that those who accept their illness are perhaps not then making moves to address their valued life goals (the next stage in ACT) and as such do not make changes in illness management, although why this is would be the case is unclear. Whereas those who do not accept their illness handover responsibility for their illness to medical professionals. This would fit with the fact that high levels of perceived medical control predict low HbA1C levels. I.e. they rely on facts about their illness and intervention from medical professionals and therefore those with low levels of acceptance (who are quite distressed about their diabetes management, controlling thoughts about diabetes and having negative thoughts about diabetes) have good control because they adhere to medical advice very closely.

4.4 Emotional Distress

Emotional distress was measured using the Hospital Anxiety and Depression Scale (HADS) (Zigmond & Snaith, 1983) which provides a measure of anxiety and depression. The finding that emotional distress was not significantly correlated to HbA1c was a surprising finding that clearly contrasts with the existing literature (Lustman *et al.*, 2000). Again the most likely explanation for this finding is that due to the large amount of missing data for this variable it is the result of inadequate sample size rather than an accurate reflection of the relationships between these variables. For correlation based analysis, to detect a medium effect size, a sample of 85 would have been necessary (Cohen, 1992).

4.5 Medical Control

Perceived medical control was significantly correlated with HbA1c levels however the relationship was negative, indicating that as perceived medical control goes up HbA1c levels go down (improve). Research suggests that people with high levels of perceived medical control together with high levels of personal control (defined as 'believers in control', Bradley *et al.*, 1990) are most likely to make effective use of both medical and personal resources in order to effectively manage their diabetes (Bradley, 1994). However those who present with high levels of medical control, low levels of personal and low levels of situational control, (defined as 'pure' medical

control externals') are likely to rely too heavily on medical intervention and have unrealistic expectations about health services.

In line with this, although the differences are not significant in the present study, those with adequate blood glucose control have higher mean levels of perceived medical control, lower levels of perceived situational control and equal levels of perceived personal control when compared to the inadequate blood glucose control group. The present study's sample have personal, medical and situational control scores all within one standard deviation of the sample means found in the study by Bradley *et al.* (1990) suggesting we should see a similar pattern of results in relation to HbA1c levels. However once again the main difference between these two samples is age, the population studied in their research were adults (range 40-65 years old). Therefore the current findings suggest that the relationship between perceived medical control and glycaemic control is distinct for older adult populations and may represent different processes of control.

The finding that older adults are more externally oriented is not necessarily surprising as previous research by Gatz and Karel (1993) found that perceived control changes over the lifespan and particularly that older adults become more externally oriented. For the population explored in the current research this may reflect cohort beliefs for this generation. One might expect this trend to change again with the next generation as a reflection of societal influences. What is surprising is that this orientation is related to adequate blood glucose control, when one would expect an inverse relationship.

Although we may assume that perceived medical control leads to better blood glucose levels, as this is a cross-sectional and correlation based study we cannot be infer causality. As noted by Archibald (1978) it is possible that health behaviours actually affect perceived control, in such a case it maybe that frequent medical appointments and check-ups lead to an increased sense of their illness being under medical control rather than under their own personal control or the control of others.

4.6 Situational Control

Based on previous research (Gillespie, 1989, Bradley *et al.* 1990) a positive relationship between situational control and HbA1c might have been expected. For example we might expect that as participants' perceptions of their illness as being controlled by the situation/chance increases, their blood glucose control becomes poorer (HbA1c levels increase) indicating that those who take less responsibility for their illness management themselves and view it as reliant upon chance or fate are more likely to have inadequate glucose control and as a result are more likely to have poorer illness trajectories. In contrast, the present study found no significant relationship between these variables. This may suggest that situational control has no relationship with HbA1c or it may reflect the fact that the study is insufficiently powered to detect such an interaction.

Interestingly, a significant positive relationship was found between situational control and knowledge, suggesting that as perceived levels of situational control increase levels of knowledge regarding diabetes also increase. This is in direct contrast to the relationship we might expect, as someone who has high levels of perceived situational control, is said to rely on fate and chance regarding their illness rather than taking any personal responsibility for it, as a result we would expect them to take less of an interest in knowledge regarding their illness.

4.7 Self-Care

While it was initially hypothesized that self-care would mediate the relationships between the predictor variables and blood glucose levels, correlation based analysis found no significant relationships between any of the variables and self-care. This may reflect a methodological issue whereby the use of self-report scales introduces a bias in responding. Indeed the mean score for self-care was approximately 70%, possibly indicating an over-estimation of appropriate self-care.

The measure used in this study had been validated on adult populations (Weinger *et al.*, 2005) as a result it is also possible that this scale lacks validity with older adult populations. Alternatively this may reflect the fact that the scale is measuring something other than self-care, although there is no evidence to suggest this as the measure has good reported reliability (Cronbach's $\alpha = 0.87$).

Caution should be noted when generalising from these results as a large amount of missing data led to the study being underpowered. In light of this it should also be considered that these results may be the result of inadequate sample size (Type II error) (see section 4.10 for discussion).

4.8 Exploratory findings

Interestingly the influence of the predictive variables did not differ significantly across the young-old and old-old age groups. In contrast to research by Connell (1999) who suggests that there are often important differences between these age groups. If this were true one might expect the largest differences to be between the young-old and oldest-old groups however there were insufficient numbers of participants in the oldest-old category, and as a result this theory remains unexplored.

4.9 Limitations and directions for future research

The limitations noted for this study limit the strength of the findings but provide direction for future research.

4.9.1. Cross sectional study design

The design of the study prevents firm conclusions from being drawn about the direction of the observed relationships. For example although one might speculate that people with low levels of acceptance of illness go on to have very well

controlled diabetes, it is possible that those with well-controlled diabetes feel no need to accept their illness as a part of themselves in the same way that someone with poorly controlled diabetes may be reminded of it more readily and thus need to become more accepting and tolerant. Due to time-limitations for the current study a longitudinal design was not feasible; however such a design would be better placed to map the processes of acceptance and changes in control over time and to be able to identify temporally which comes first and how these factors might exert influence upon each other.

4.9.2. Missing data & sample size

The initial sample of 81 participants was good although still slightly underpowered for the initial path model, when according to Green (1991) n should have been 98. As a result of adjusting the analytic plan, all variables were entered in to one multiple regression model, this led to seven predictive variables instead of the planned six and as a result n should have equalled 106. Unfortunately the large amounts of missing data particularly on the Perceived Control of Diabetes Scale (Bradley, 1993) and the Hospital Anxiety and Depression Scale (HADS, Zigmond & Snaith, 1983) meant that the study was too underpowered to examine a predictive model. In light of this correlations were reported instead. The correlations were still underpowered and as a result the chances of committing a type-II error increased (Cohen, 1992), as a result caution must be exercised when interpreting the results.

The version of the Perceived Control of Diabetes Scale (Bradley, 1993) used in this study provides a measure that was designed specifically for patients with Type-II diabetes and has been used in previous research to examine similar relationships. This scale has good reported validity and reliability with patients with Type-II diabetes. Despite this, it was felt that this scale was very long (six subscales) and as a result the questionnaire was shortened to five subscales in the hope that this would reduce the burden of responding for participants. This shortened version also had good reliability and was given to participants as part of a package of questionnaires; however a large number either did not complete or attempt to fill it in. Despite the length of the scale being reduced for this study some participants reported it was 'just too long'. It was certainly the longest questionnaire in the pack and took approximately 10 minutes complete. One explanation for this lack of response may be that the questionnaire simply lacked face validity amongst this older adult population. Another possibility is that the order the questionnaires were given to participants influenced their completion, this is likely as the perceived control questionnaire was given at the end of the pack, in light of this future studies may wish to vary the order in which the questionnaires are given.

The data on emotional distress (HADS, Zigmond & Snaith, 1983) was due to be collected by the researcher from the clinic database after it had been completed by the participant during their clinic appointment and the data had been transferred to the database by the appointed clinician, as per usual clinical procedure. Unfortunately the clinicians did not always enter this data into the database. On discussion with the clinic's consultant the patient files were requested from medical

records and examined for copies of the HADS or recorded results. Unfortunately most of these were not filed and the consultant suggested that they were most likely not carried out during the appointment.

It was possible that those who had missing data were in some way different to those who did not, for example one might hypothesize that those with poorer blood glucose levels may be more or less motivated to partake in research, which would introduce a response bias. In fact no significant differences were found on any of the predictor or dependant variables for those who completed full data sets and those who did not. However exploratory analysis did reveal that those who had missing data were significantly different from those who had complete data sets in terms of the time since their original diagnosis, with those who had missing data having a shorter time since diagnosis. This may suggest that those who had had the illness for longer felt they had more to gain by participating in research; however the effect size for this finding was only small.

Is it also possible that some other factor not measured by this study was responsible for separating those who completed questionnaires and those who did not, such as cognitive ability. There are reported cognitive effects associated with diabetes (Logroscino, *et al.*, 2004) and as the author did not have access to cognitive information for the potential participants this theory remains unexplored and should be a consideration when conducting future research with this client group.

4.9.3. Measures used

The use of self-report measures for the predictor variables is another limitation of the study. Specifically, the finding that self-care did not predict blood glucose levels is surprising as illness management and lifestyle/dietary choices should be closely linked to blood glucose control. It is possible that this is partly due to the method of data collection i.e. self-report. If this is the case it may be helpful for future research to gather information about participants' self-care behaviours from a variety of sources e.g. their spouses, diary records or via their allocated diabetes specialist nurses with whom they have close relationships and who would be well placed to make non-biased evaluations of patient's self-care activities.

The use of the Hospital Anxiety and Depression Scale (HADS) as one composite score meant it was not possible to separately examine the effects of the different types of emotional distress (anxiety and depression) and their individual relationship with blood glucose levels. However this measure did provide a reliable and brief assessment of emotional functioning.

4.9.4. Uncontrolled variables

As previously noted it is never possible to control for all other contributing factors. In this study it is likely that the effects of additional variables such as co-morbid

physical health conditions and cognitive ability have a role to play in not only the ability to fully complete questionnaires but may also impact upon participants' levels of acceptance, knowledge, self-care and perceived control. Due to the limited time scale for this project and having access to only two clinics per week, the study was unable to control for such factors, however this should be a consideration for any future research.

4.10 Strengths of the study

Despite the later reduction in sample size, due to missing data, the initial recruitment of 81 participants is promising and suggests that this client group are willing to take part in research that could aid illness management.

A particular strength of this study is its focus on an older adult specific population. This is a population which has historically been under-researched and the findings from the study emphasize the importance of examining older adults in their own right in order to provide an insight into the similarities and differences in the processes involved in diabetes control for younger and older adults.

The unique contribution of this study was in examining several factors in relation to HbA1c levels. This combination of factors, together with this population have not (to the author's knowledge) being examined in this way before.

4.11 Theoretical Implications

The results provide an insight into the management of diabetes in older adults and also highlight a number of differences in the role of psychological factors in relation to blood glucose control. They stress the importance of acceptance in controlling blood glucose in this population. However, the indication is that acceptance actually relates to poorer control of diabetes within this population. Of course this may be due to a latent third factor not identified in this study or it may be a genuine finding for this population. Clearly this finding is of interest and should be re-examined by future studies, possibly using longitudinal designs to examine the relationships between these two factors in more detail. In addition, as these findings are correlation based, we cannot assume acceptance causes changes in HbA1c as it is possible that people with poor glycaemic control have to practice more acceptance based skills as a result.

The usefulness of medical control in diabetes management is also of interest as this is in contrast with previous research. It would be useful to replicate this finding with a larger sample. In addition, the fact that within this study higher levels of emotional distress did not correlate with blood glucose levels is very unusual given the body of evidence to the contrary (Lustman *et al.*, 2000) .

Future research may also wish to explore the impact of psychosocial factors upon older adulthood, such as changes in social support, quality and quantity of available support and the impact this has upon health behaviours as suggested by Connell (1999).

4.12 Clinical Implications

This study provides evidence that perceived medical control is related to blood glucose levels. It is possible there is a cohort effect enacted in this older adult sample, whereby generational beliefs about medical professionals are very strong and as such they tend not to question or take responsibility away from the medical professional. As a result they rely heavily upon instruction and medical intervention rather than personal resources. It would be important to establish such cohort beliefs before planning any psychological interventions with such a population as it would be likely that conventional cognitive behavioural approaches would fail to establish changes in lifestyle and diet if the patient believes they have no personal control over change.

If these findings were replicated for older adult populations it may be relevant to tailor educational interventions to increase patient's perceptions of medical control and to decrease their reliance on situational control if one wanted to improve glycaemic control.

The unusual findings in this study emphasise the need to consider a developmental model of older adulthood and the role of cohort beliefs in illness management. In addition it is increasingly important to acknowledge the sensory and cognitive changes that may take place and how this may impact upon participation in research. Most importantly these findings emphasize the need to tailor interventions appropriately to take on board these changes.

4.13 Conclusions

The most striking theme to emerge from this research is the apparent uniqueness of the older adult population with diabetes in comparison to younger adults with diabetes. This strengthens the importance of exploring older adult populations in their own right, rather than assuming the factors that affect glucose control in younger adults affect older adults in the same way.

References

- Aalto, A.M & Uutela, A. (1997) Glycemic control, self-care behaviours, and psychosocial factors among insulin treated diabetics: A test of an Extended Health Belief Model. *International Journal of Behavioural Medicine* Vol 4 (3), 191-214
- Abourizk, N.N., O'Connor, P.J., Crabtree, B.F & Schnatz, D (1994) An outpatient model of integrated diabetes treatment and education: functional, metabolic, and knowledge outcomes. *The diabetes educator*, Vol 20, 5, Sept-Oct, 416-421
- Abrahamson, L. Y., Seligman, M. E. P., & Teasdale, J. D. (1978). Learned helplessness in humans: Critique and reformulation. *Journal of Abnormal Psychology*, 87, 49-74.
- Action to Control Cardiovascular risk in Diabetes study group (2008) Effects of intensive glucose lowering in Type 2 diabetes. *The New England Journal of Medicine*. Vol 358, No 24 (June 12).
- Ajzen, I. (1991) The theory of planned behaviour. *Organizational Behaviour and Human Decision Processes*, 50, 179-211
- Ajzen, I (1988) Attitudes, Personality and Behaviour. *Milton Keynes*: Open University Press
- Allan, J. L., Johnston, D.W., Johnston, M & Mant, D (2007) Depression and perceived behavioural control are independent predictors of future activity and fitness after coronary syndrome events. *Journal of psychosomatic research*, 63, 501-508
- Allison, K. R (1991) Theoretical issues concerning the relationship between perceived control and preventative health behaviour. *Health education research; theory and practice* Vol 6, 2, 141-151
- Allison, K.R & Coburn, D (1985) Explaining low levels of exercise amongst blue collar workers. *CAHPER Journal*, 51(7), 34-37
- Archibald, W (1978) *Social psychology as political economy*. McGraw-Hill, Toronto
- Armitage, C, J & Conner, M (2001) Efficacy of the Theory of Planned Behaviour: A meta-analytic review. *British journal of social psychology*, 40, 471-499
- Bandura, A (1986) *Social foundations of thought and action*: Englewood Cliffs, NJ: Prentice Hall
- Bayliss, E. A., Ellis, J. L & Steiner, J.F (2007) Barriers to self-management and quality-of-life outcomes in seniors with multimorbidities. *Annals of family medicine*, Vol 5 (5), Sept-Oct, 395-402
- Beeny, L., Dunn, S.M & Welch, G (1994) Measurement of diabetes knowledge-The development of the DKN scales. In Bradley, C (1994) *Handbook of psychology and diabetes: A guide to psychological measurement in diabetes research and practice* Harwood academic publishers: Great Britain
- Bennett, P (2000) *Introduction to clinical health psychology*. Buckingham: Open university press
- Bjork, S (2001) The cost of diabetes care. *Diabetes Research and Clinical Practice* 54 Suppl 1, 13-18

- Black, S.A & Markides, K.S (1999) Depressive symptoms and mortality in older Mexican Americans. *Ann Epidemiology*, 9, 1, 45-52
- Bloom-Cerkoney, K.A & Hart, L.K (1980) The Relationship between the Health Belief Model and Compliance of Persons with Diabetes Mellitus. *Diabetes Care* Vol 3(5), 594-598
- Bradley, C., Brewin, C.R., Gamsu, D. S & Moses, J. L (1984) Development of scales to measure perceived control of diabetes mellitus and diabetes-related health beliefs. *Diabetic Medicine*, 1, 213-218
- Bradley, C., Gamsu, D.S., Moses, J.L., Knight, G., Boulton, A.J.M., Dury, J & Ward, J.D (1987) The use of Diabetes-specific perceived control and health belief measures to predict treatment choice and efficacy in a feasibility study of continuous subcutaneous insulin infusion pumps. *Psychology and Health*, Vol 1, 133-146
- Bradley, C. R., Lewis, K.S., Jennings, A.M & Ward, J.D (1990) Scales to measure perceived control developed specifically for people with tablet-treated diabetes. *Diabetic Medicine*, 7, 685-694
- Bradley, C (1993) Designing medical and educational intervention studies: a review of some alternatives to conventional randomised controlled trials. *Diabetes Care*, 16, 509-518
- Bradley, C (1994) *Handbook of psychology and diabetes: A guide to psychological measurement in diabetes research and practice* Harwood academic publishers: Great Britain
- Bramwell, (1996) Advanced uses of multiple regression. In Haworth, J. T (Ed.) *Psychological research: Innovative methods and strategies*. London: Routledge
- Broome, A & Llewelyn, S (Ed.) (1989) *Health Psychology: Process and Applications*. Chapman & Hall
- Brownlee-Duffeck, M., Peterson, L., Simonds, J.F., Goldstein, D., Kilo, C & Hoette, S (1987) The Role of Health Beliefs in the Regimen Adherence and Metabolic Control of Adolescents and Adults with Diabetes Mellitus. *Journal of Consulting and Clinical Psychology* Vol 55 (2), 139-144
- Bond, F.W & Bunce, D (2000) Mediators of change in emotion-focused and problem-focused worksite stress management interventions. *Journal of occupational health psychology*, 5, 156-163
- Bond, F.W & Bunce, D (2003) The role of acceptance and job control in mental health, job satisfaction, and work performance. *Journal of applied psychology*, 111 (1), 180-185
- Bosma, H., Schrijvers, C & Mackenbach, J. P (1999) Socioeconomic inequalities in mortality and importance of perceived control: cohort study. *BMJ*, 319; 1469-1470
- Bosworth, H.B., Oddone, E.Z & Weinberger, M (2005) *Patient treatment adherence concepts, interventions and measurement*. Routledge
- Bowerman, B.L. & O'Connell, R.T (1990) *Linear statistical models: an applied approach* (2nd edition). Belmont, CA: Duxbury
- Calfee, C.S., Katz, P.P., Yelin, E.H., Iribarren, C & Eisner, M.D (2006) The influence of perceived control of asthma on health outcomes. *Chest*, 130: 1312-1318
- Calnan, M (1989) Control over health and patterns of health-related behaviour. *Social science and medicine*, 29, 131-136

- Chambless, D.L & Ollendick, T.H. (2001) Empirically supported psychological interventions: Controversies and evidence. *Annual Review of Psychology*, 52, 685-716
- Cassano, P & Fava, M (2002) Depression and public health: An overview. *Journal of psychosomatic research*, 53, 849-857
- Chavez, E.L & Michaels, A.C (1980) Evaluation of the health locus of control for obesity treatment. *Psychological Reports*, 47, 709-710
- Charcot, J.M. (1889). Clinical lectures on diseases of the nervous system. *New Sydenham Society*, London.
- Chipperfield, J. G & Greenslade, L (1999) Perceived control as a buffer in the use of health care services. *Journals of gerontology series B: Psychological sciences and social sciences*, Vol 54, 3, 146-154
- Chodosh, J., Morton, S.C., Mojica, W., Maglione, M., Suttorp, M.J., Hilton, L., Rhodes, S & Shekelle, P (2005) Meta-analysis: Chronic disease self-management programs for older adults. *Annals of internal medicine*, 143, 427-438
- Cohen, J (1992) Quantitative methods in psychology: A power primer *Psychological bulletin*, Vol 112, 1, 155-159
- Cohen S, Rodriguez MS. (1995) Pathways linking affective disturbances and physical disorders. *Health Psychology* Vol 5:374-80.
- Cohen, S.T., Welch, G., Jacobson, A.M., De Groot, M & Samson, J (1997) The association of lifetime psychiatric illness and increased retinopathy in patients with type I diabetes mellitus. *Psychosomatics*, 38,2 Mar-Apr, 98-108
- Connell, C.M (1999) Older adults in health education research: some recommendations. *Health Education Research: Theory & Practice* Vol 14 (3), 427-431
- Conner, M & Armitage, C.J (1998) Extending the theory of planned behavior: A review and avenues for further research. *Journal of applied social psychology*, 28, 1429-1464
- Conner. M & Norman. P (Eds.) (1996) *Predicting health behaviour*. Buckingham: Open University Press
- Corrigan, P. W (2001) Getting ahead of the data: A threat to some behaviour therapies. *The Behaviour Therapist*, 24, 189-193
- Crawford JR, Henry JD, Crombie C, Taylor EP (2001) Normative data for the HADS from a large non-clinical sample. *British Journal of Clinical Psychology*, 40, 429-434
- Cull, C, A., Wright, A.D., Macloed, K.M., Holman, R.R (2001) Hypoglycaemia in patients with Type-2 diabetes in the UKPDS. *Diabetologia*, Vol 44, Suppl 1. A217
- DCCT Research Group (1993) The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependent diabetes mellitus. The Diabetes Control and Complications Trial Research Group. *N Engl J Med*. Sep 30;329(14):977-86.
- Dunn, S.M., Bryson, J.M., Hoskins.P.L., Alford.J.B., Handelsman.D.J & Turtle.J.R. (1984) Development of the Diabetes Knowledge (DKN) Scales: Forms DKNA, DKNB and DKNC. *Diabetes Care*, 7 (1), 36-41

- DeGroot, M., Anderson, R., Freedland, K.E., Clouse, R.E & Lustman, P.J (2001) Association of depression and diabetes complications: A meta-analysis. *Psychosomatic medicine*, 63, 619-630
- DiMatteo, M.R & DiNicola, D. D. (1982) *Achieving Patient Compliance: the Psychology of the Medical Practitioner's Role*. New York: Pergamon Press
- Dimatteo, M.R., Lepper, H.S & Crighan, T.W (2000) Depression is a risk factor for non-compliance with medical treatment: meta-analysis of the effects of anxiety and depression on patient adherence. *Archives of international medicine*, 160, 2101-2107
- Donaldson-Feilder, E.J & Bond, F.W (2004) The relative importance of psychological acceptance and emotional intelligence to workplace well-being. *British journal of guidance & counselling*, 32 (2), 187-203
- Engel, G. L (1977) *The need for a new medical model*. 196:129-136
- Field, A (2005) *Discovering statistics using SPSS* (second edition) London: Sage publications
- Freud, S. (1893). Quelques considérations pour une étude comparative des paralysies motrices organiques et hystériques. *Archives de Neurologie*, 26, 29-43.
- Gatz, M & Karel, M. J (1993) Individual change in perceived control over 20 years. *International journal of behavioural development*, 16, 305-322
- Gao, L., Mathews, F. E., Sargaent, L.A., Brayne, C & MRC CFAS (2008) An investigation of the population impact of variation in HbA1c levels in older adults in England and Wales: From a population based multi-centre longitudinal study BMC public Health, Vol 8, 54 <http://www.biomedcentral.com/1471-2458/8/54>
- Gierszewski, S.A (1983) The relationship of weight loss, locus of control, and social support. *Nursing research*, 32, 43-47
- Gillespie, C. R (1989) *Psychological variables in the self-regulation of diabetes mellitus*. Unpublished Ph.D thesis, University of Sheffield
- Gillibrand, R & Stevenson, J (2006) The extended health belief model applied to the experience of diabetes in young people. *British journal of Health Psychology* Vol 11, 155-169
- Gilmer, T.P., O'Connor, P.J., Manning, W.G & Rush, W.A (1997) The cost to health plans of poor glycemic control. *Diabetes care*, Vol 20, 1847-1853
- Gilmer, T, P, O'Connor, J, Rush, W, Crain, A,L, Whitebird, R,R, Hanson, A, N & Solberg, L, I (2005) Predictors of Health Care Costs in Adults with Diabetes. *Diabetes Care*, Vol 28, Number 1, January.
- Godin, G., & Kok, G. (1996). The theory of planned behavior: A review of its applications to health-related behaviors. *American Journal of Health Promotion*, 11, 87-98
- Gonzalez, J.S., Safren, S.A., Calgiero, E., Wexler, D.L., Delhanty, L., Wittenberg, E., Blais, M.A., Meigs, J.B & Grant, R.W (2007) Depression, self-care, and medication adherence in Type 2 diabetes: Relationships across the full range of symptom severity. *Diabetes care*, Vol 30, 9, 2222-2227J
- Gomel, M.K., Oldenberg, B., Simpson, J.M., Chilvers, M & Owen, N (1997) Composite cardiovascular risk outcomes of a work-site intervention trial. *American journal of public health*. Vol 87, Issue 4 673-676

- Greco, P., LaGreca, A., Ireland, S., Wick, P., Freeman, C., Agramonte, R., Gutt, M & Skyler, (1990) Assessing adherence in IDDM: a comparison of two methods (Abstract). *Diabetes*, 40 (1), A165
- Green, S. B. (1991). How many subjects does it take to do a regression analysis? *Multivariate Behavioral Research*, Vol 26, 499-510.
- Gregg, J.A., Callaghan, G.M., Hayes, S.C & Glenn-Lawson, J.L (2007) Improving diabetes self-management through acceptance, mindfulness, and values: A randomised controlled trial. *Journal of consulting and clinical psychology*, 75, 336-343
- Harris, R (2006) Embracing your demons: An overview of Acceptance and Commitment Therapy. *Psychotherapy in Australia*, Vol 12, 4, August
- Harrison, J.A., Mullen, P.D & Green, L.W (1992) A meta-analysis of studies of the Health Belief Model with adults. *Health Education Research* Vol 7 (1), 107-116
- Hampson, S.E., Glasgow, R.E & Foster, L.S (1995) Personal models of diabetes among older adults: Relationship to self-management and other variables. *The Diabetes Educator* Vol 21 (4), 300-307
- Hayes, S.C., Strosahl, K.D & Wilson (1999) *Acceptance and commitment therapy: An experiential approach to behaviour change*. New York: Guilford press
- Hayes, S. C. (2004) Acceptance and Commitment Therapy, Relational Frame Theory, and the third wave of behaviour therapy. *Behavior Therapy*, 35: 639-665
- Hardeman & Johnston (2002) Application of the theory of planned behaviour change. *Psychology and Health*, 17, 123-158
- Heider, F. (1944). Social perception and phenomenal causality. *Psychological Review*, 51, 358-374
- Heijman, M.J (1998) Coping and adaptive outcome in chronic fatigue syndrome: importance of illness cognitions. *Journal of psychosomatic research* 45, 39-51
- Howell, D.C. (2007) *The treatment of missing data*:
www.uvm.edu/~dhowell/StatPages/More_Stuff/Missing_Data
- Jacobson, A.M (1996) The psychological care of patients with insulin-dependent diabetes mellitus. *N Engl J Med*, 334, 1249-1253
- Jones, H., Edwards, L., Vallis, M.T., Ruggiero, L., Rossi, S.R., Ross, J.S., *et al.* (2003) Changes in diabetes self-care behaviours make a difference in glycemic control: The diabetes stages of change (DISC) study. *Diabetes care*, Vol 26, 3, 732-737
- Johnston, M., Morrison, V., Macwalter, R., and Partridge, C (1999) Perceived control, coping and recovery from disability following stroke. *Psychology and Health*. 14, 181-366
- Katon, W & Ciechanowsk, P (2002) Impact of major depression on chronic medical illness. *Journal of Psychosomatic Research*, 53, 859-863
- Katz, I.R (1996) On the Inseparability of Mental and Physical Health in Aged Persons Lessons from Depression and Medical Comorbidity. *American Journal of Geriatric Psychiatry* 4:1-16, February
- Kelley, H.H (1967) Attribution theory in social psychology. *Nebraska Symposium on Motivation*, Vol 15, 192-238
- Kirscht, J.P (1972) Perception of control and health beliefs. *Canadian journal of behavioural science*, 4, 225-237

- Knol, M.J., Twisk, J.W.R., Beekman, A.T.F., Heine, R.J., Snoek, F.J & Pouwer, F (2006) Depression as a risk factor for the onset of type 2 diabetes mellitus. A meta-analysis. *Diabetologia*, 49, 837-845
- Kohlenberg, R. J. & Tsai, M. (1991). *Functional Analytic Psychotherapy: A guide for creating intense and curative therapeutic relationships*. New York: Plenum.
- Laffrey, S.C & Isenberg, M (1983) The relationship of internal locus of control, value placed on health, perceived importance of exercise and participation in physical activity during leisure. *International journal of nursing studies*, 20, 187-196
- Lange, L.J & Piette, J. D (2005) Perceived health status and perceived diabetes control: psychological indicators and accuracy. *Journal of psychosomatic research*, 58, 129-137
- Leventhal, H. (1970). Findings and theory in the study of fear communications. *Advances in Experimental Social Psychology*, 5, 119-186.
- Leventhal, H., Meyer, D., & Nerenz, D. (1980). The common sense representation of illness danger. In S. Rachman (Ed.), *Medical psychology* (Vol II, pp.7-30), New York: Pergamon Press.
- Lin, E.H.B., Katon, W., Von Korff, M., Simon, G.E., Oliver, M., Ciechanowski, P., *et al.* (2004) Relationship of depression and diabetes self-care, medication adherence, and preventive care. *Diabetes Care*, Vol27, 9, 2154-2160
- Linehan, M. M. (1993a). *Cognitive behavioural treatment of borderline personality disorder*. New York: Guilford Press.
- Linehan, M. M. (1993b). *Skills training manual for treating borderline personality disorder*. New York: Guilford Press
- Logroscino, G., Hee Kang, J & Grodstein, F (2004) Prospective study of type 2 diabetes and cognitive decline in women aged 70-81 years. *British Medical Journal*, 328-548
- Ludgren, T., Dahl, J., Merlin, L & Kies, B (2006) Evaluation of acceptance and commitment therapy for drug refractory epilepsy: A randomised controlled trial in South Africa- a pilot study. *Epilepsia*, 47, 2173-2179
- Ludgren., T., Dahl, J & Hayes, S.C (2008) Evaluation of mediators of change in the treatment of epilepsy with acceptance and commitment therapy. *Journal of behavioural medicine*, Vol 31,3
- Lustman, P.J., Anderson.R.J., Freedland, K.E., DeGroot, M., Carney,R.M & Clouse, R.E (2000) Depression and poor glycaemic control: A meta-analytic review of the literature. *Diabetes Care*, Vol 23, 7, 934-942
- Marin, G., Burhansstipanov, L., Connell, C.M., Gielen, A.C., Helitzer-Allen, D., Lorig, K., *et al.* (1995) A Research Agenda for Health Education Among Underserved Populations. *Health Education Quarterly*, 22 (3), 346-363
- Marmont, M (1978) Employment grade and coronary heart disease in British civil servants. *Journal of epidemiology and community health*, 32, 244-249
- McCraken, L.M. (1998) Learning to live with the pain: acceptance of pain predicts adjustment in persons with chronic pain. *Pain*, 74, 21-7
- McCraken, L.M., Carson, J.W., Eccleston, C & Keefe, F.J (2004) Acceptance and change in the context of chronic pain. *Pain*, 109, 4-7
- McCraken, L.M., Eccleston, C (2005) A prospective study of acceptance of pain and patient functioning with chronic pain. *Pain*, 118, 164-169

- McCracken, L.M., Gross, R.T., Aitkens, J. & Carnrike, C.L.M (1996) The assessment of anxiety and fear in persons with chronic pain: a comparison of instruments. *Behaviour Research and Therapy*, 34, 927-933
- Menard, S (1995) *Applied logistic regression analysis*. Sage university paper series on quantitative applications in the social sciences 07-106. Thousand oaks, CA: Sage
- Menec, V.H & Chipperfield, J. G (1997) The interactive effect of perceived control and functional status on health and mortality among young-old and old-old adults. *Journals of gerontology series B: Psychological sciences and social sciences*, Vol 52, 3, 118-126
- Moss-Morris R, Petrie KJ, Weinman J: Functioning in chronic fatigue syndrome: do illness perceptions play a regulatory role? *Br J Health Psychol* 1996; 1:15-25
- Nagelkerk, J., Reick, K & Meengs, L (2006) Perceived barriers and effective strategies to diabetes self-management. *Journal of advanced nursing*, 54 (2), 151-158
- Norman, P (1990) Health locus of control beliefs and preventive health behaviours. *Journal of the institute of health education*, 28, 113-117
- Norman, P & Bennett, P (1990) Health Locus of Control. In Conner. M & Norman. P (Eds.) *Predicting health behaviour*. (p 63-93) Buckingham: Open University Press
- Norris, S.L, Engelgau, M.M & Narayan, K.M.V (2001) Effectiveness of self-management training in Type-II diabetes: A systematic review of randomised controlled trials. *Diabetes care*, Vol 24, 3, 561-587
- Ogden, J (2000) *Health Psychology a textbook*: second edition. Buckingham: Open University Press
- Ost, L-G (2008) Efficacy of the third wave of behaviour therapies: A systematic review and meta-analysis. *Behaviour Research and Therapy*, 46, 296-321
- Palinkas LA, Barrett-Connor E, Wingard DL, Type 2 diabetes and depressive symptoms in older adults: a population-based study, *Diabetic Medicine*, 8(6), 532-9, July 1991
- Partridge, C.J and Johnston, M (1989) Perceived control and recovery from physical disability. *British Journal of Clinical Psychology*. 28, 53-60
- Penninx, B.W.J.H., Beekman, A.T.F., Honig, A., Deeg, D.J.H., Schoevers, R.A & van Eijk, J.T.M *et al.* (2001) Depression and cardiac mortality – Results from a community-based longitudinal study. *Arch General Psychiatry*, Vol 58, 221-227
- Peterson, C., Semel, A., Von Baeyer, C., Abramson, L.Y., Metalsky, G.I & Seligman, M.E.P (1982) The attributional style questionnaire. *Cognitive therapy and research*, 6, 287-300
- Persell, S.D., Keating, N.L., Landrum, M.B., Landon, B.E., Ayanian, J.Z., Borbas, C & Guadagnoli, E (2004) Relationship of diabetes-specific knowledge to self-management activities, ambulatory preventive care, and metabolic outcomes. *Preventive medicine*, 39, 746-752
- Pirl, W.F & Roth, A.J (1999) Diagnosis and treatment of depression in cancer patients. *Oncology*, 13, 9, 1293-301
- Pitts, M & Philips, K (Ed.) (1991) *The psychology of health*. London: Routledge
- Polly, R.K (1992) Diabetes Health Beliefs, Self-Care Behaviors, and Glycemic Control Among Older Adults with Non-Insulin Dependent Diabetes Mellitus. *The Diabetes Educator* Vol 18, 321-327

- Prochaska, J & DiClemente, C (1983) Stages and processes of self-change in smoking: toward and integrative model of change. *Journal of consulting and clinical psychology*, 5, 390-395
- Rakowski, W., Dube, C. E., Marcus, B. H., Prochaska, J. O., Velicer, W. R., & Abrams, D. B. (1992). Assessing elements of women's decisions about mammography. *Health Psychology* Vol 11, 111-118.
- Rogers, R. W. (1975). A protection motivation theory of fear appeals and attitude change. *Journal of Psychology*, 91, 93-114
- Rogers, R.W. (1983). Cognitive and physiological processes in fear appeals and attitude change: A revised theory of protection motivation. In J. Cacioppo & R. Petty (Eds.), *Social Psychophysiology*. New York: Guilford Press.
- Richardson, A., Adner, N & Nordstrom (2001) Persons with insulin-dependent diabetes mellitus: acceptance and coping ability. *Journal of advanced nursing*, 33, 6, 758-763
- Rosenstock, I.M (1974) Historical origins of the Health Belief Model. *Health Education Monographs*, 2, 328-335
- Rosenstock, I. M., Strecher, V.J & Becker, M. H (1988) Social Learning Theory and the Health Belief Model. *Health Education Quarterly* Vol 15(2), 175-183
- Rosenthal, R. (1979). The "file drawer problem" and tolerance for null results. *Psychological Bulletin*, 86, 638-641.
- Rosenthal, R. (1984). *Applied Social Research Methods Series*, Vol. 6. Meta-analytic procedures for social research. Newbury Park, CA: Sage Publications.
- Roth, P (1994) Missing data: A conceptual review for applied psychologists. *Personnel psychology*, Vol 47, 537-560
- Roth, P, L., Campion, J.E & Jones, S.D (1996) The impact of four missing data techniques on validity estimates in human resource management. *Journal of business and psychology*. Vol 11, 1, 101-112
- Rotter, J. B (1966) Generalized expectancies for internal verses external control of reinforcement. *Psychological Monographs*, 80, (1, 609)
- Rotter, J.B (1975) Some problems and misconceptions related to the construct of internal verses external control of reinforcement. *Journal of consulting and clinical psychology*, 43, 56-67
- Rubin, R.R (2000) Diabetes and quality of life. *Diabetes Spectrum*, Vol 13, 21-23
- Saltzer, E (1982) The weight locus of control (WLOC) scale: a specific measure for obesity research. *Journal of personality assessment*, 46, 620-62
- Sanders. G & Suis. J. (ed.) (1982) *Social psychology of health and illness*, New Jersey: Erlbaum.
- Segal, Z. V., Williams, J. M. G., & Teasdale, J. D. (2002) *Mindfulness-based Cognitive therapy for depression: A new approach to preventing relapse*. New York: Gilford Press
- Seligman, M. E. P (1975) *Helplessness: On depression, development, and death*. San Francisco: Freeman
- Schifter, D. E., & Ajzen, I. (1985). Intention, perceived control, and weight loss: An application of the theory of planned behavior. *Journal of Personality and Social Psychology*, 49 (3), 843-851.
- Schwarzer, R. (Ed.) (1992) *Self Efficacy: Thought Control of Action*. Washington, DC: Hemisphere.

- Scottish Executive. (2004) *Diabetes in Scotland: Current Challenges and Future Opportunities. Reviewing the Scottish Diabetes Framework*. Edinburgh Scotland: Scottish Executive.
- SIGN Guidelines (2001) *Management of Diabetes*
- Slenker, S.E., Price, J.H & O'Connell, J.K (1985) Health locus of control of joggers and nonexercisers. *Perceptual and motor skills*, 61, 323-328
- Stevens, J.P (1992) *Applied multivariate statistics for the social sciences*. (2nd edition) Hillsdale, NJ: Erlbaum
- Sutton, S (1998a) Predicting and explaining intentions and behaviour: How well are we doing? *Journal of applied social psychology*, 28, 1317-1338
- Talbot, F & Nouwen, A (2000) A review of the relationship between depression and diabetes in adults. *Diabetes care*, Vol 23, 10, 1556-15562
- The National Collaborating Centre for Chronic Conditions. (2008) *Type 2 diabetes; National clinical guideline for management in primary and secondary care (update)*. London: The royal collage of physicians
- The Scottish Office. (1997) *Designed to care: renewing the National Health Service in Scotland*. Cm 3811. The Stationery Office.
- The Scottish Government (2007) *Better Health, Better Care*.
<http://www.scotland.gov.uk/Publications/2007/12/11103453/9>
- Thompson, S, C & Schlehofer, M, M (n.d) *Perceived control In Health behaviour constructs: Theory, Measurement & Research*. Cancer control and population sciences: www.cancercontrol.gov/brp/
- Thompson, S. C. & Spacapan, S. (1991). Perceptions of control in vulnerable populations. *Journal of Social Issues*, 47, 1-21
- UK Prospective Diabetes Study (UKPDS). Intensive blood glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes (ukpds 33). *The Lancet* (1998) 352: 837-53
- Walker E.A.; Gelfand M.D.; Gelfand A.N.; Creed F.; Katon W.J. (1996) The Relationship of Current Psychiatric Disorder to Functional Disability and Distress in Patients with Inflammatory Bowel Disease. *General Hospital Psychiatry* Vol 18 (4) 220-229(10)
- Wallhagen, M. I (1999) Perceived control and psychosocial/physiological functioning in African American elders with Type-II diabetes. *The diabetes educator*, Vol 25, 4, 568-575
- Wallston, K.A., Wallston, B.S & De Vellis, R (1978) Development of the multidimensional health locus of control (MHLC) scales. *Health education monographs*, 6, 160-170
- Weinger, K., Welsch, G.W., Butler, H.A & La Greca, A.M (2005) Measuring diabetes self-care: A psychometric analysis of the self-care inventory-revised with adults. *Diabetes Care*, Vol 28, 6, 1346-1352
- Weinstein, N. D., Rothman, A. J & Sutton, S. R (1998) Stage theories of health behavior: Conceptual and methodological issues. *Health psychology*, Vol 17, 3 May, 290-299
- Wells, K.B., Rogers, W., Burnam, A., Greenfield, S & Ware, J.E (1991) How the medical comorbidity of depressed patients differs across health care settings: results from the Medical Outcomes Study. *American journal of psychiatry*, 148, 12, Dec, 1688-1696

- Wild S, Roglic G, Green A, Sicree R, King H. (2004) Global Prevalence of Diabetes: Estimates for the year 2000 and projections for 2030. *Diabetes Care* Vol 27, 1047-1053.
- White, C.A. (2001) *Cognitive behaviour therapy for chronic medical problems: A guide to assessment and treatment in practice*. Chichester. Wiley
- Whitelaw, S., Baldwin, S., Bunton, R & Fynn, D (2000) The status of evidence and outcome in stages of change research. *Health education research*, Vol 15, 6, 707-718
- World Health Organisation & International Diabetes Federation: *Definition and diagnosis of diabetes mellitus and intermediate hyperglycemia: Report of a WHO/IDF Consultation*. WHO Document Production Services, Geneva, Switzerland (2006)
- World Health Organisation: *Diabetes*: Fact sheet No 312. September 2006. www.who.int/mediacentre/factsheets
- Wrisley, D & Rubenfire, M (1988) Ineffectiveness of standardized dietary counselling in hypercholesterolemic patients with coronary disease. *J Cardiopulm Rehabil.* 8, 226-230.
- MZigmond AS, Snaith RP (1983) The Hospital Anxiety And Depression Scale. *Acta Psychiatr Scand*, 67:361-70

APPENDIX A



West Lothian
Community Health and Care Part

Dear Sir/Madam,

Thank you for agreeing to take a few minutes to read this letter. I enclose some information about research that we are conducting in collaboration with the University of Edinburgh.

You have been identified from our records as someone who attends St John's Hospital Diabetes Clinic for outpatient appointments; as a result we think you would be highly suitable to take part in our study. The research that we are conducting looks at how much psychological factors can affect people's ability to control their diabetes. In the future this information may help us to plan more effective treatment approaches.

I enclose some more detailed information about the study.

We would be very appreciative of your time and help in this matter if you felt able to participate in this research.

Please do not hesitate to contact either of us on the above telephone number if you have any questions about the study or you would like some more information.

Yours sincerely

Victoria Thurlby
Trainee Clinical Psychologist

Dr Charlotte Holmes
Chartered Clinical Psychologist



West Lothian
Community Health and Care Partnership
INFORMATION SHEET

Title of Project: An exploration of perceived control, acceptance, emotional distress and knowledge in the control of diabetes in an older adult population

A lot of work has been done to look at how individual psychological factors affect our health and in particular our ability to maintain good health or change health behaviours. Researchers have been looking at all these factors to show how they explain a person's health behaviours.

Researchers have suggested a number of competing factors. This study aims to look at four different approaches to understanding diabetes control in people over the age of 65 years. The overall aim is to understand which factors are important in improving patient self-care and control over diabetes.

Aim of the research:

- Examine which psychological factors are most important in controlling diabetes

If you agree to take part in this study, I will ask you to **complete a questionnaire when you attend your next routine diabetes outpatient appointment. The questionnaire will take about 20-30 minutes to complete** and can be completed when you are waiting for appointments/results at the clinic. You will be asked when you register for your appointment if you wish to take part in the study. If you do, the researcher will explain the process to you and ask you to sign a consent form. If you do not complete the questionnaire during your appointment you will be given a stamped addressed envelope to return the questionnaire at a later date.

Once your responses on the questionnaires have been matched to your HbA1C outcome (a measure of the control of your diabetes) and HADS scores (a measure of anxiety and depression) for that appointment, your questionnaire responses will be coded so that they become anonymous. Your questionnaires will be stored in a secure place.

You are completely free not to participate in this study and you are free to withdraw from the study at anytime, without any explanation. Your participation or refusal to participate in this study will not affect your care/treatment.

If you have any questions about the research, please contact me on the number at the top of this page or see attached sheet to contact one of my research supervisors or an independent advisor.



**West Lothian
Community Health and Care Partnership**

CONSENT FORM

Title of Project: An exploration of perceived control, acceptance, emotional distress and knowledge in the control of diabetes in an older adult population

Name of Researcher: Victoria Thurlby, Trainee Clinical Psychologist

Please initial

I confirm that I have read and understand the information sheet for the above study and have had the opportunity to ask questions.

I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected.

I understand that any information, disclosed during the course of the research, will remain confidential unless deemed important for my continuing care in which case it will be shared with my diabetes specialist nurse.

I confirm that the researcher may have access my HbA1C outcome for my most recent test.

I confirm that the researcher may access my most recent Hospital Anxiety and Depression Score.

I agree to my GP being informed of my participation in the study.

I agree to take part in the above study.

Name of Patient

Date

Signature of Patient

Date

Signature of Researcher

APPENDIX B

An exploration of perceived control, acceptance and knowledge in the control of diabetes in an older adult population

Researcher – Victoria Thurlby

Questionnaire pack Number -

Thank you for taking part in this research. Please read the questions carefully before answering. Please follow instructions where given. Please give an answer to all the questions. If you have any questions please ask the researcher for advice.

Instruction: Please circle the appropriate answer:

a) Are you Male or Female?

b) Are you aged 65-74 years old?

75-84 years old?

85 + years old?

c) Do you have a diagnosis of Coronary Heart Disease? Yes/No/D/K

d) Do you have a diagnosis of High blood pressure/Hypertension? Yes/No/D/K

e) Approximately how long have you been diagnosed with diabetes? Please state answer:.....

The Self-Care Inventory-Revised Version

Instructions: This survey measures what you actually do, not what you are advised to do. How often have you followed your diabetes treatment plan in the past 12 months?

1) Check Blood Glucose With Monitor	<i>Never</i> 1	<i>Rarely</i> 2	<i>Sometimes</i> 3	<i>Usually</i> 4	<i>Always</i> 5
2) Record Blood glucose Results	<i>Never</i> 1	<i>Rarely</i> 2	<i>Sometimes</i> 3	<i>Usually</i> 4	<i>Always</i> 5
3) Take the correct dose of diabetes pills or insulin	<i>Never</i> 1	<i>Rarely</i> 2	<i>Sometimes</i> 3	<i>Usually</i> 4	<i>Always</i> 5
4) Take diabetes pills or insulin at the right time	<i>Never</i> 1	<i>Rarely</i> 2	<i>Sometimes</i> 3	<i>Usually</i> 4	<i>Always</i> 5
5) Eat the correct food portions	<i>Never</i> 1	<i>Rarely</i> 2	<i>Sometimes</i> 3	<i>Usually</i> 4	<i>Always</i> 5
6) Eat meals/snacks on time.	<i>Never</i> 1	<i>Rarely</i> 2	<i>Sometimes</i> 3	<i>Usually</i> 4	<i>Always</i> 5
7) Keep food records	<i>Never</i> 1	<i>Rarely</i> 2	<i>Sometimes</i> 3	<i>Usually</i> 4	<i>Always</i> 5
8) Read food labels	<i>Never</i> 1	<i>Rarely</i> 2	<i>Sometimes</i> 3	<i>Usually</i> 4	<i>Always</i> 5
9) Treat low blood glucose With just the recommended Amount of carbohydrate.	<i>Never</i> 1	<i>Rarely</i> 2	<i>Sometimes</i> 3	<i>Usually</i> 4	<i>Always</i> 5
10) Carry quick acting sugar to treat low blood glucose	<i>Never</i> 1	<i>Rarely</i> 2	<i>Sometimes</i> 3	<i>Usually</i> 4	<i>Always</i> 5
11) Come in for clinic appointments	<i>Never</i> 1	<i>Rarely</i> 2	<i>Sometimes</i> 3	<i>Usually</i> 4	<i>Always</i> 5
12) Exercise	<i>Never</i> 1	<i>Rarely</i> 2	<i>Sometimes</i> 3	<i>Usually</i> 4	<i>Always</i> 5

The Acceptance and Action Diabetes Questionnaire

Instructions: This is a questionnaire to look at how you feel about having diabetes. There are a series of statements, read each statement and rate how true it is for you by circling the most appropriate number from 1 to 7.

1) I try to avoid reminders of my diabetes

<i>Never true</i>	<i>Very seldom</i>	<i>Seldom</i>	<i>Sometimes</i>	<i>Frequently</i>	<i>Almost always</i>	<i>Always</i>
<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>
1	2	3	4	5	6	7

2) I have thoughts and feelings about being diabetic that are distressing

<i>Never true</i>	<i>Very seldom</i>	<i>Seldom</i>	<i>Sometimes</i>	<i>Frequently</i>	<i>Almost always</i>	<i>Always</i>
<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>
1	2	3	4	5	6	7

3) I do not take care of my diabetes because it reminds me that I have diabetes

<i>Never true</i>	<i>Very seldom</i>	<i>Seldom</i>	<i>Sometimes</i>	<i>Frequently</i>	<i>Almost always</i>	<i>Always</i>
<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>
1	2	3	4	5	6	7

4) I eat things I shouldn't eat when the urge to eat them is overwhelming

<i>Never true</i>	<i>Very seldom</i>	<i>Seldom</i>	<i>Sometimes</i>	<i>Frequently</i>	<i>Almost always</i>	<i>Always</i>
<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>
1	2	3	4	5	6	7

5) When I have an upsetting feeling or thought about my diabetes, I try to get rid of that feeling or thought.

<i>Never true</i>	<i>Very seldom</i>	<i>Seldom</i>	<i>Sometimes</i>	<i>Frequently</i>	<i>Almost always</i>	<i>Always</i>
<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>
1	2	3	4	5	6	7

6) I avoid taking or forget to take my medication because it reminds me I have diabetes.

<i>Never true</i>	<i>Very seldom</i>	<i>Seldom</i>	<i>Sometimes</i>	<i>Frequently</i>	<i>Almost always</i>	<i>Always</i>
<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>
1	2	3	4	5	6	7

7) I avoid stress or try to get rid of it by eating what I know I shouldn't eat.

<i>Never true</i>	<i>Very seldom</i>	<i>Seldom</i>	<i>Sometimes</i>	<i>Frequently</i>	<i>Almost always</i>	<i>Always</i>
<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>
1	2	3	4	5	6	7

8) I often deny to myself what diabetes can do to my body.

<i>Never true</i>	<i>Very seldom</i>	<i>Seldom</i>	<i>Sometimes</i>	<i>Frequently</i>	<i>Almost always</i>	<i>Always</i>
<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>
1	2	3	4	5	6	7

9) I don't exercise regularly because it reminds me that I have diabetes.

<i>Never true</i>	<i>Very seldom</i>	<i>Seldom</i>	<i>Sometimes</i>	<i>Frequently</i>	<i>Almost always</i>	<i>Always</i>
<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>
1	2	3	4	5	6	7

10) I avoid thinking about what diabetes can do to me.

<i>Never true</i>	<i>Very seldom</i>	<i>Seldom</i>	<i>Sometimes</i>	<i>Frequently</i>	<i>Almost always</i>	<i>Always</i>
<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>
1	2	3	4	5	6	7

11) I avoid thinking about diabetes because I knew someone who died from diabetes.

<i>Never true</i>	<i>Very seldom</i>	<i>Seldom</i>	<i>Sometimes</i>	<i>Frequently</i>	<i>Almost always</i>	<i>Always</i>
<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>	<i>True</i>
1	2	3	4	5	6	7

The Diabetes Knowledge Scale (DKN)

Instructions: This is a short quiz to find out how much you know about diabetes. There are 15 questions and each one has several possible answers. For questions 1 to 12 only one answer is correct. If you know the right answer, circle the letter in front of it. If you do not know the answer, circle the letter in front of 'I don't know'. Notice that Questions 13, 14 and 15 have more than one correct answer, so you should circle all the answers you think are correct.

1) In uncontrolled diabetes the blood sugar is:

- A – Normal
- B – Increased
- C – Decreased
- D – I don't know

2) Which one of the following is true

- A – It does not matter if your diabetes is not fully controlled, as long as you do not have a coma
- B – It is best to show some sugar in the urine in order to avoid hypoglycaemia
- C – Poor control of diabetes could result in greater chance of complications later
- D – I don't know

3) The NORMAL range for blood glucose is:

- A – 4-8 mmol/L
- B – 7-15 mmol/L
- C – 2-10 mmol/L
- D – I don't know

4) Butter is mainly:

- A – Protein
- B – Carbohydrate
- C – Fat
- D – Mineral and vitamin
- E – I don't know

5) Rice is mainly:

- A – Protein
- B – Carbohydrate
- C – Fat
- D – Mineral and vitamin
- E – I don't know

8) If a person on insulin has a high blood or sugar level and ketones were present they should:

- A – Increase insulin
- B – Decrease insulin
- C – Keep insulin and diet the same, and test blood/ urine later
- D – I don't know

9) When people with diabetes on insulin become ill and unable to eat the prescribed diet:

- A – They should immediately stop taking insulin
- B – They must continue to take insulin
- C – They should use diabetic tablets instead of insulin
- D – I don't know

10) If you feel the beginnings of hypoglycaemia you should:

- A – Immediately take some insulin or tablets
- B – Immediately lie down and rest
- C – Immediately eat or drink something sweet
- D – I don't know

11) You can eat as much as you like of which of the following foods:

- A – Apples
- B – Celery
- C – Meat
- D – Honey
- E – I don't know

12) Hypoglycaemia is caused by:

- A – Too much insulin
- B – Too little insulin
- C – Too little exercise
- D – I don't know

6) The presence of ketones in the urine is:

- A – A good sign
- B – A bad sign
- C – A usual finding in diabetes
- D – I don't know

7) Which of the following possible complications is usually not associated with diabetes?

- A – Changes in vision
- B – Changes in the kidney
- C – Changes in the lung
- D – I don't know

13) A kilogram is:

- A – A metric unit of weight
- B – Equal to 10 pounds
- C – A metric unit of energy
- D – A little more than two pounds
- E – I don't know

14) Two of the following substitutions are right

- A – One portion (1oz) bread = 4 cracker biscuits (e.g. Sao Biscuits)
- B – One egg = one portion of mince
- C – 5oz milk = 5 oz of orange juice
- D – $\frac{3}{4}$ cup of cornflakes = $\frac{3}{4}$ cup cooked porridge
- E – I don't know

15) If I don't feel like the egg allowed on my diet for breakfast I can:

- A – Have extra toast
- B – Substitute one small lamb cutlet
- C – Have an ounce of cheese instead
- D – Forget about it
- E – I don't know

**THANK YOU FOR TAKING THE TIME TO COMPLETE THESE QUESTIONNAIRES
YOUR TIME IS APPRECIATED**

If you have any questions please do not hesitate to ask the researcher

HADS

Name: _____

Date: _____

This questionnaire is designed to help your clinician to know how you feel. Read each item below and **underline the reply** which comes closest to how you have been feeling in the past week. Ignore the numbers printed at the edge of the questionnaire.

Don't take too long over your replies, your immediate reaction to each item will probably be more accurate than a long, thought-out response.

FOLD HERE				FOLD HERE	
A	D			A	D
		I feel tense or 'wound up'	I feel as if I am slowed down		
3		Most of the time	Nearly all the time	3	
2		A lot of the time	Very often	2	
1		From time to time, occasionally	Sometimes	1	
0		Not at all	Not at all	0	
		I still enjoy the things I used to enjoy	I get a sort of frightened feeling like 'butterflies' in the stomach		
0		Definitely as much	Not at all	0	
1		Not quite so much	Occasionally	1	
2		Only a little	Quite often	2	
3		Hardly at all	Very often	3	
		I get a sort of frightened feeling as if something awful is about to happen	I have lost interest in my appearance		
3		Very definitely and quite badly	Definitely	3	
2		Yes, but not too badly	I don't take as much care as I should	2	
1		A little, but it doesn't worry me	I may not take quite as much care	1	
0		Not at all	I take just as much care as ever	0	
		I can laugh and see the funny side of things	I feel restless as if I have to be on the move		
0		As much as I always could	Very much indeed	3	
1		Not quite so much now	Quite a lot	2	
2		Definitely not so much now	Not very much	1	
3		Not at all	Not at all	0	
		Worrying thoughts go through my mind	I look forward with enjoyment to things		
3		A great deal of the time	As much as I ever did	0	
2		A lot of the time	Rather less than I used to	1	
1		Not too often	Definitely less than I used to	2	
0		Very little	Hardly at all	3	
		I feel cheerful	I get sudden feelings of panic		
3		Never	Very often indeed	3	
2		Not often	Quite often	2	
1		Sometimes	Not very often	1	
0		Most of the time	Not at all	0	
		I can sit at ease and feel relaxed	I can enjoy a good book or radio or television programme		
		Definitely	Often	0	
		Usually	Sometimes	1	
		Not often	Not often	2	
		Not at all	Very seldom	3	

Now check that you have answered all the questions

TOTAL

A	D

Instructions for Completion of
The Perceived Control of Diabetes Scales

The following questions are about the causes of situations which might happen to you. We ask you to imagine that the events described have happened to you recently.

While events may have many causes, we want you to pick only one - the *major* cause of the situation as you see it. Please write this cause in the space provided after each event.

Next, we want you to answer some questions about the cause by circling the most appropriate number on a sliding scale from 6 to 0.

Imagine that you have recently become unacceptably overweight.

Write down, in the space below, the single most likely cause of becoming overweight.

Now rate this cause on the following scales:

1. To what extent was the cause due to something about you?

Totally due to me	6	5	4	3	2	1	0	Not at all due to me
-------------------	---	---	---	---	---	---	---	----------------------

2. To what extent was the cause due to the treatment recommended by your doctor?

Totally due to treatment recommended	6	5	4	3	2	1	0	Not at all due to treatment recommended
--------------------------------------	---	---	---	---	---	---	---	---

3. To what extent was the cause something to do with other people or circumstances?

Totally due to other people or circumstances	6	5	4	3	2	1	0	Not at all due to other people or circumstances
--	---	---	---	---	---	---	---	---

4. To what extent was the cause due to chance?

Totally due to chance	6	5	4	3	2	1	0	Not at all due to chance
-----------------------	---	---	---	---	---	---	---	--------------------------

5. To what extent was the cause controllable by you?

Totally controllable by me	6	5	4	3	2	1	0	Totally uncontrollable by me
----------------------------	---	---	---	---	---	---	---	------------------------------

6. To what extent was the cause controllable by your doctor?

Totally controllable by my doctor	6	5	4	3	2	1	0	Totally uncontrollable by my doctor
-----------------------------------	---	---	---	---	---	---	---	-------------------------------------

7. To what extent do you think you could have foreseen the cause of becoming overweight?

Totally foreseeable by me	6	5	4	3	2	1	0	Totally unforeseeable by me
---------------------------	---	---	---	---	---	---	---	-----------------------------

Imagine that for several days you have found high levels of sugar when you tested your blood or urine.

Write down the single most likely cause of the high sugar levels in the space below.

Now rate this cause on the following scales:

1. To what extent was the cause due to something about you?

Totally due to me 6 5 4 3 2 1 0 Not at all due to me

2. To what extent was the cause due to the treatment recommended by your doctor?

Totally due to treatment recommended 6 5 4 3 2 1 0 Not at all due to treatment recommended

3. To what extent was the cause something to do with other people or circumstances?

Totally due to other people or circumstances 6 5 4 3 2 1 0 Not at all due to other people or circumstances

4. To what extent was the cause due to chance?

Totally due to chance 6 5 4 3 2 1 0 Not at all due to chance

5. To what extent was the cause controllable by you?

Totally controllable by me 6 5 4 3 2 1 0 Totally uncontrollable by me

6. To what extent was the cause controllable by your doctor?

Totally controllable by my doctor 6 5 4 3 2 1 0 Totally uncontrollable by my doctor

7. To what extent do you think you could have foreseen the cause of the high sugar levels?

Totally foreseeable by me 6 5 4 3 2 1 0 Totally unforeseeable by me

Imagine that you have been able to keep your weight at an acceptable level for a period of several weeks and you have felt fit and well.

Write down, in the space below, the single most likely cause of this period of good weight control and sense of general well-being.

Now rate this cause on the following scales:

1. To what extent was the cause due to something about you?

Totally due to me	6	5	4	3	2	1	0	Not at all due to me
-------------------	---	---	---	---	---	---	---	----------------------

2. To what extent was the cause due to the treatment recommended by your doctor?

Totally due to treatment recommended	6	5	4	3	2	1	0	Not at all due to treatment recommended
--------------------------------------	---	---	---	---	---	---	---	---

3. To what extent was the cause something to do with other people or circumstances?

Totally due to other people or circumstances	6	5	4	3	2	1	0	Not at all due to other people or circumstances
--	---	---	---	---	---	---	---	---

4. To what extent was the cause due to chance?

Totally due to chance	6	5	4	3	2	1	0	Not at all due to chance
-----------------------	---	---	---	---	---	---	---	--------------------------

5. To what extent was the cause controllable by you?

Totally controllable by me	6	5	4	3	2	1	0	Totally uncontrollable by me
----------------------------	---	---	---	---	---	---	---	------------------------------

6. To what extent was the cause controllable by your doctor?

Totally controllable by my doctor	6	5	4	3	2	1	0	Totally uncontrollable by my doctor
-----------------------------------	---	---	---	---	---	---	---	-------------------------------------

7. To what extent do you think you could have foreseen the cause of the period of good weight control?

Totally foreseeable by me	6	5	4	3	2	1	0	Totally unforeseeable by me
---------------------------	---	---	---	---	---	---	---	-----------------------------

Imagine that you have successfully avoided the complications of diabetes such as problems with your feet.

Write down, in the space below, the single most likely cause of the successful avoidance of diabetic complications such as problems with your feet.

Now rate this cause on the following scales:

1. To what extent was the cause due to something about you?

Totally due to me	6	5	4	3	2	1	0	Not at all due to me
-------------------	---	---	---	---	---	---	---	----------------------

2. To what extent was the cause due to the treatment recommended by your doctor?

Totally due to treatment recommended	6	5	4	3	2	1	0	Not at all due to treatment recommended
--------------------------------------	---	---	---	---	---	---	---	---

3. To what extent was the cause something to do with other people or circumstances?

Totally due to other people or circumstances	6	5	4	3	2	1	0	Not at all due to other people or circumstances
--	---	---	---	---	---	---	---	---

4. To what extent was the cause due to chance?

Totally due to chance	6	5	4	3	2	1	0	Not at all due to chance
-----------------------	---	---	---	---	---	---	---	--------------------------

5. To what extent was the cause controllable by you?

Totally controllable by me	6	5	4	3	2	1	0	Totally uncontrollable by me
----------------------------	---	---	---	---	---	---	---	------------------------------

6. To what extent was the cause controllable by your doctor?

Totally controllable by my doctor	6	5	4	3	2	1	0	Totally uncontrollable by my doctor
-----------------------------------	---	---	---	---	---	---	---	-------------------------------------

7. To what extent do you think you could have foreseen the cause of successfully avoiding complications?

Totally foreseeable by me	6	5	4	3	2	1	0	Totally unforeseeable by me
---------------------------	---	---	---	---	---	---	---	-----------------------------

Imagine that you have reduced your weight to a satisfactory level after a period when you gained too much weight.

Write down the single most likely cause of this weight reduction in the space below.

Now rate this cause on the following scales:

1. To what extent was the cause due to something about you?

Totally due to me	6	5	4	3	2	1	0	Not at all due to me
-------------------	---	---	---	---	---	---	---	----------------------

2. To what extent was the cause due to the treatment recommended by your doctor?

Totally due to treatment recommended	6	5	4	3	2	1	0	Not at all due to treatment recommended
--------------------------------------	---	---	---	---	---	---	---	---

3. To what extent was the cause something to do with other people or circumstances?

Totally due to other people or circumstances	6	5	4	3	2	1	0	Not at all due to other people or circumstances
--	---	---	---	---	---	---	---	---

4. To what extent was the cause due to chance?

Totally due to chance	6	5	4	3	2	1	0	Not at all due to chance
-----------------------	---	---	---	---	---	---	---	--------------------------

5. To what extent was the cause controllable by you?

Totally controllable by me	6	5	4	3	2	1	0	Totally uncontrollable by me
----------------------------	---	---	---	---	---	---	---	------------------------------

6. To what extent was the cause controllable by your doctor?

Totally controllable by my doctor	6	5	4	3	2	1	0	Totally uncontrollable by my doctor
-----------------------------------	---	---	---	---	---	---	---	-------------------------------------

7. To what extent do you think you could have foreseen the cause of the weight reduction?

Totally foreseeable by me	6	5	4	3	2	1	0	Totally unforeseeable by me
---------------------------	---	---	---	---	---	---	---	-----------------------------

APPENDIX C

Appendix C (i) Pearson's correlation analysis: 65-74 year old age group

	HbA1c
Self-Care	Pearson's correlation Sig (2-tailed) N
	-.056 .708 47
Acceptance	Pearson's correlation Sig (2-tailed) N
	.129 .394 46
Personal Control	Pearson's correlation Sig (2-tailed) N
	.118 .514 33
Medical Control	Pearson's correlation Sig (2-tailed) N
	-.269 .130 33
Situational Control	Pearson's correlation Sig (2-tailed) N
	.214 .231 33
Knowledge	Pearson's correlation Sig (2-tailed) N
	-.122 .480 36
Emotional Distress	Pearson's correlation Sig (2-tailed) N
	-.058 .737 36

Appendix C (ii) Pearson's correlation analysis: 75-84 year old age group
 (* correlation is significant at 0.05 level, 2-tailed)

		HbA1c
Self-Care	Pearson's correlation Sig (2-tailed) N	-.448* .022 26
Acceptance	Pearson's correlation Sig (2-tailed) N	.366 .055 28
Personal Control	Pearson's correlation Sig (2-tailed) N	-.403 .097 18
Medical Control	Pearson's correlation Sig (2-tailed) N	-.345 161 18
Situational Control	Pearson's correlation Sig (2-tailed) N	.138 .585 18
Knowledge	Pearson's correlation Sig (2-tailed) N	-.149 .509 22
Emotional Distress	Pearson's correlation Sig (2-tailed) N	.242 .255 24

Appendix (C iii) Independent samples t-test for young-old (65-74 years old) and old-old (75-84 years old) age groups

Levene's Test for Equality of Variances				t-test for Equality of Means			
	F	Sig.	t	df	Sig. (2-tailed)	Lower	Upper
Self Care	Equal variances assumed Equal variances not assumed	.887 Equal variances not assumed	.349 -1.545 -5.12	71 43.248	.588 .611	-7.29599 -7.72760	4.16540 4.59701
Acceptance	Equal variances assumed Equal variances not assumed	.220 Equal variances not assumed	.640 -.997 -1.022	72 61.602	.322 .311	-6.59519 -6.50156	2.19767 2.10404
Perceived personal control	Equal variances assumed Equal variances not assumed	1.040 Equal variances not assumed	.313 .282 .299	49 41.208	.779 .766	-3.45969 -3.25214	4.58999 4.38244
Perceived medical control	Equal variances assumed Equal variances not assumed	.552 Equal variances not assumed	.461 -.101 -.098	49 32.205	.920 .922	-4.41896 -4.60286	3.99472 4.17861
Perceived situational control	Equal variances assumed Equal variances not assumed	.370 Equal variances not assumed	.546 .471 .462	49 33.218	.640 .647	-2.36949 -2.46631	3.81898 3.91580
Knowledge	Equal variances assumed Equal variances not assumed	1.668 Equal variances not assumed	.202 -.258 -.272	56 52.092	.798 .786	-1.75124 -1.66949	1.35225 1.27050
Emotional distress	Equal variances assumed Equal variances not assumed	2.381 Equal variances not assumed	.128 -.282 -.268	58 40.905	.779 .790	-3.60196 -3.79447	2.71307 2.90558
HbA1c	Equal variances assumed Equal variances not assumed	.851 Equal variances not assumed	.359 -.318 -.303	77 52.623	.751 .763	-.91367 -.95746	.66211 .70859
Time since diagnosis	Equal variances assumed Equal variances not assumed	5.655 Equal variances not assumed	.020 -2.102 -1.957	74 46.680	.039 .056	-5.60906 -5.84013	-.15029 -.08078

Appendix C (iv) Pearson's correlation analysis: Adequate blood glucose control group

		HbA1c
Self-Care	Pearson's correlation	-.057
	Sig (2-tailed)	.729
	N	39
Acceptance	Pearson's correlation	.002
	Sig (2-tailed)	.988
	N	40
Personal Control	Pearson's correlation	-.250
	Sig (2-tailed)	.209
	N	27
Medical Control	Pearson's correlation	.025
	Sig (2-tailed)	.903
	N	27
Situational Control	Pearson's correlation	.027
	Sig (2-tailed)	.894
	N	27
Knowledge	Pearson's correlation	.160
	Sig (2-tailed)	.365
	N	34
Emotional Distress	Pearson's correlation	-.033
	Sig (2-tailed)	.855
	N	33

Appendix C (v) Pearson's correlation analysis: Inadequate blood glucose control group

		HbA1c
Self-Care	Pearson's correlation	-.169
	Sig (2-tailed)	.331
	N	35
Acceptance	Pearson's correlation	.176
	Sig (2-tailed)	.304
	N	36
Personal Control	Pearson's correlation	-.123
	Sig (2-tailed)	.565
	N	24
Medical Control	Pearson's correlation	-.262
	Sig (2-tailed)	.215
	N	24
Situational Control	Pearson's correlation	.166
	Sig (2-tailed)	.438
	N	24
Knowledge	Pearson's correlation	-.354
	Sig (2-tailed)	.076
	N	26
Emotional Distress	Pearson's correlation	.041
	Sig (2-tailed)	.832
	N	29

Appendix C (vi): Independent samples t-test for adequate verses inadequate blood glucose control groups

		Levene's Test for Equality of Variances		t-test for Equality of Means					
		F	Sig.	t	df	Sig. (2-tailed)	95% Confidence Interval of the Difference		
							Lower	Upper	
Self Care	Equal variances assumed	.174	.678	1.854	72	.068	-.37166	10.24543	
	Equal variances not assumed			1.843	68.728	.070	-.40787	10.28165	
Acceptance	Equal variances assumed	1.607	.209	-1.973	74	.052	-8.17961	.04072	
	Equal variances not assumed			-2.001	72.044	.049	-8.12308	-.01581	
Perceived personal control	Equal variances assumed	503	.482	-.354	49	.725	-4.53040	3.17299	
	Equal variances not assumed			-.351	45.696	.727	-4.57239	3.21499	
Perceived medical control	Equal variances assumed	.564	.463	1.878	49	.066	-.25395	7.52710	
	Equal variances not assumed			1.865	46.318	.069	-.28816	7.56131	
Perceived situational control	Equal variances assumed	2.483	.121	-1.128	49	.265	-4.57719	1.28553	
	Equal variances not assumed			-1.140	48.829	.260	-4.54633	1.25467	
Knowledge	Equal variances assumed	.441	.509	-.156	58	.877	-1.59778	1.36701	
	Equal variances not assumed			-.157	55.011	.876	-1.59129	1.36052	
Emotional distress	Equal variances assumed	1.208	.276	-.864	60	.391	-4.28073	1.69766	
	Equal variances not assumed			-.873	59.940	.386	-4.24927	1.66620	
Time since diagnosis	Equal variances assumed	1.591	.211	1.348	76	.182	-.85135	4.42023	
	Equal variances not assumed			1.363	75.262	.177	-.82434	4.39323	
Age	Equal variances assumed	.518	.474	-.663	79	.509	-.32250	.16132	
	Equal variances not assumed			-.662	78.155	.510	-.32280	.16163	

APPENDIX D

Appendix D: Missing data independent samples t-test

		Levene's Test for Equality of Variances		t-test for Equality of Means					
		F	Sig.	t	df	Sig. (2-tailed)	95% Confidence Interval of the Difference		
							Lower	Upper	
Self Care	Equal variances assumed	1.372	.245	.164	72	.870	-4.98051	5.87308	
	Equal variances not assumed			.163	68.046	.871	-5.01384	5.90642	
Acceptance	Equal variances assumed	.008	.929	.673	74	.503	-2.78459	5.62348	
	Equal variances not assumed			.678	73.821	.500	-2.75013	5.58902	
Perceived Personal control	Equal variances assumed	2.015	.162	-.226	49	.822	-4.69806	3.74695	
	Equal variances not assumed			-.194	19.648	.848	-5.60129	4.65017	
Perceived medical control	Equal variances assumed	.195	.661	.003	49	.998	-4.40708	4.41819	
	Equal variances not assumed			.002	25.554	.998	-4.57033	4.58144	
Perceived situational control	Equal variances assumed	.098	.755	.845	49	.402	-1.87080	4.58746	
	Equal variances not assumed			.807	23.867	.427	-2.11519	4.83186	
Knowledge	Equal variances assumed	.003	.960	-.204	58	.839	-1.65201	1.34645	
	Equal variances not assumed			-.201	46.513	.842	-1.68592	1.38037	
Emotional Distress	Equal variances assumed	1.059	.308	-.312	60	.756	-3.51319	2.56447	
	Equal variances not assumed			-.302	46.869	.764	-3.63576	2.68704	
Time since diagnosis	Equal variances assumed	1.202	.276	-2.952	76	.004*	-6.28044	-1.21956	
	Equal variances not assumed			-2.917	69.492	.005*	-6.31445	-1.18555	
Age	Equal variances assumed	1.946	.167	.454	79	.651	-.18805	.29916	
	Equal variances not assumed			.463	78.754	.645	-.18349	.29460	
HbA1C Level	Equal variances assumed	.904	.345	.048	79	.961	-.73479	.77145	
	Equal variances not assumed			.047	59.654	.963	-.76982	.80648	

APPENDIX E

Appendix E: Missing data groups means and standard deviations

	N	Mean	St Deviation
Missing Data Cases			
Self Care	38	69.86	10.58
Acceptance	40	58.73	9.83
HbA1C	45	7.82	1.38
Personal Control	15	21.01	8.70
Medical Control	15	10.70	7.30
Situational Control	15	8.07	5.64
Emotional Distress	26	10.69	6.60
Complete Data Cases			
Self Care	36	69.42	12.79
Acceptance	36	57.31	8.41
HbA1C	36	7.81	2.01
Personal Control	36	21.49	5.93
Medical Control	36	10.69	7.08
Situational Control	36	6.71	5.05
Emotional Distress	36	11.17	5.35